MISSOURI BOTANICAL GARDEN
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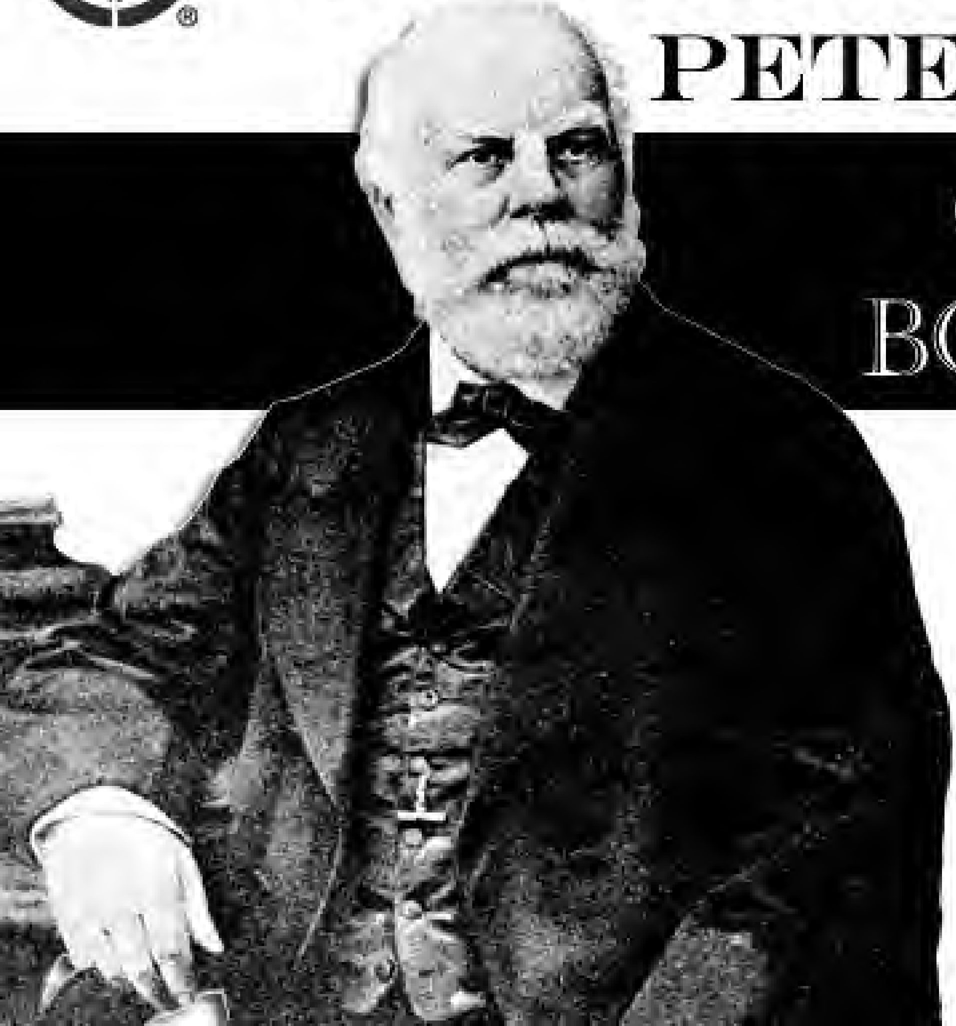

# GEORGE ENGELMANN BOTANICAL NOTEBOOKS

*Pagination Note:*
*Since many of the items lack a specific page number, the page number displayed online refers to the sequentially created number each item was given upon cataloging the materials.*

| | | | | | | |
|---|---|---|---|---|---|---|
| July | 2 | 4 | | | | 3 |
| August | 3 | | 1 | | 1 | 2 |
| September | 4 | | | 1 | 4 | 8 |
| October | 3 | 1 | 1 | 1 | 7 | 1 |
| November | 2 | 3 | | 7 | | 7 |
| December | 2 | 3 | | | | 6 |
| | 50 + el. | 36 + el. | 23 — el. | 28 — el. | 15 no el. | 34 no el. |

Snowing was accompanied

| | By Positive Electricity. | | By Negative Electricity. | | By no Electricity. | |
|---|---|---|---|---|---|---|
| | In 1861. | In 1862. | In 1861. | In 1862. | In 1861. | In 1862. |
| January | 3 | 9 | | 2 | | |
| February | 12 | 8 | | 1 | | |
| March | 3 | 12 | | | | |
| October | | 1 | | | | |
| November | | 4 | | | | |
| December | 5 | 2 | 2 | | | 1 |
| | 23 + el. | 36 + el. | 2 — el. | 3 — el. | | 1 no el. |

### REMARKS.

The monthly mean of atmospheric electricity in 1862 was not quite so regular as that in 1861. While in 1861 an un-

W. Brasiliensis
vera

112

7833

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GEORGE ENGELMANN PAPERS

Or we may divide the twelve months of each year into three groups. The first group with the highest electricity is formed by the months of January, February, November and December; the second with a mean electricity by the months of March, April, May and October; and the third with the lowest electricity by the months of June, July, August and September.

The aggregate monthly mean of

| | | | | | |
|---|---|---|---|---|---|
| The first group | in 1861 | is | 52.9— | in 1862, | 54.6 |
| The second | " | " | 33.5 | " | 35.2 |
| The third | " | " | 14.1 | " | 10.5 |

Thus in 1861 the third group prevailed, and in 1862 the first and second. But these differences are so well balanced throughout the year, that the mean of the whole year in 1861 and in 1862 is exactly the same, namely, 8.4. Such an identity in the yearly result, even to decimals, is of course not to be expected every year; but it seems to prove, at least, that the yearly mean of electricity is as constant as that of temperature, of relative humidity, and of atmospheric pressure.

The third table, showing the daily periodicity of atmospheric electricity, confirms the daily two maxima and two minima of electricity as an undeniable fact.

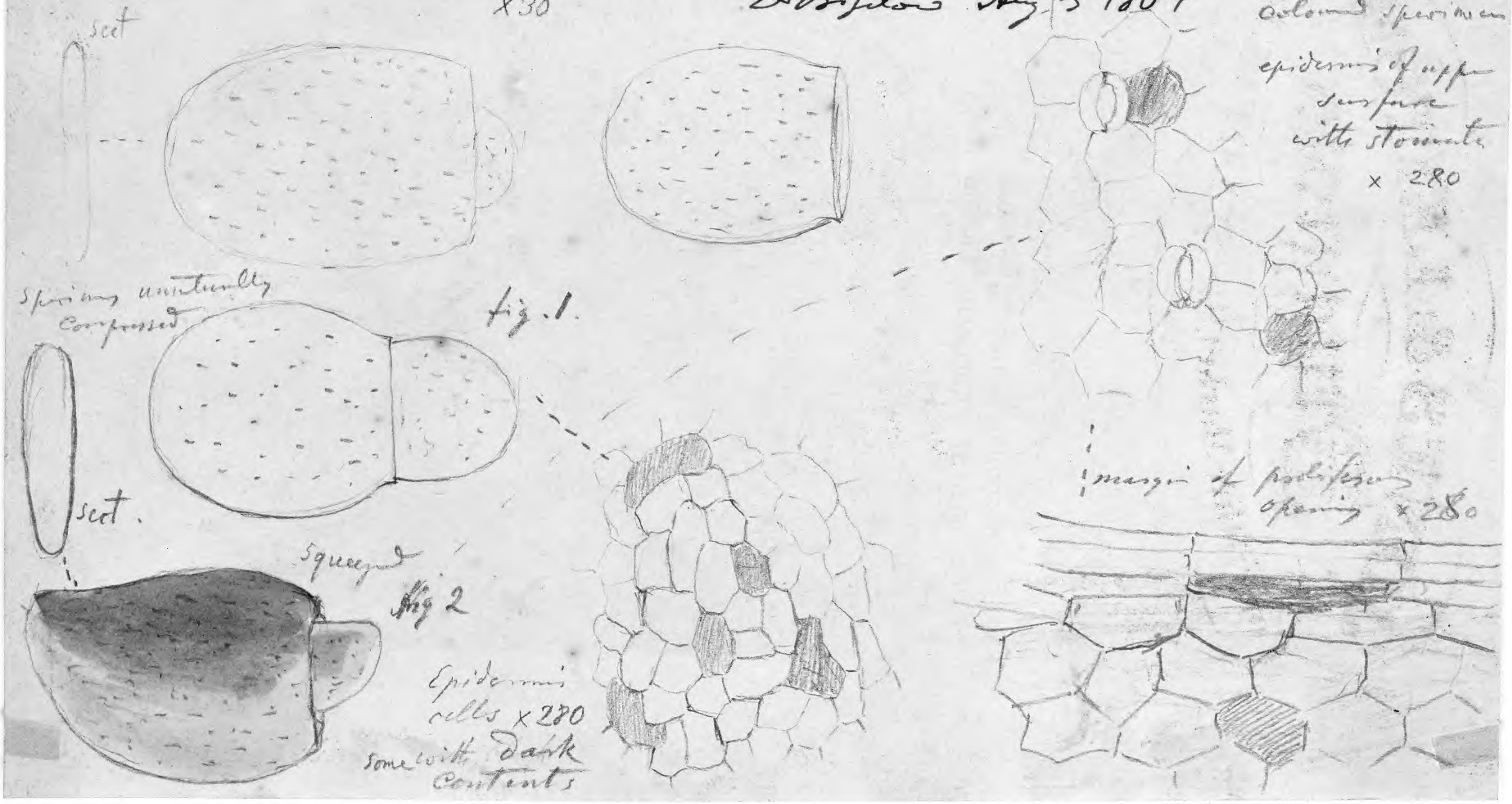
Wolffia Brasiliensis

Aug 7 1867

flat, disclike

River Rouge Detroit,
with Wolffia arhiza (Columbiana) & Lemna,
Dr Bigelow Aug 3 1867

x 30


sect
Specimens unnaturally compressed
fig. 1
sect.
squeezed
fig 2
Epidermis cells x 280 some with dark contents
This belongs to the coloured specimen
epidermis of upper surface with stomata
x 280
margin of proliferous opening x 280

0 1 2 3 4 5 6 7 8 9 10
cm
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7834

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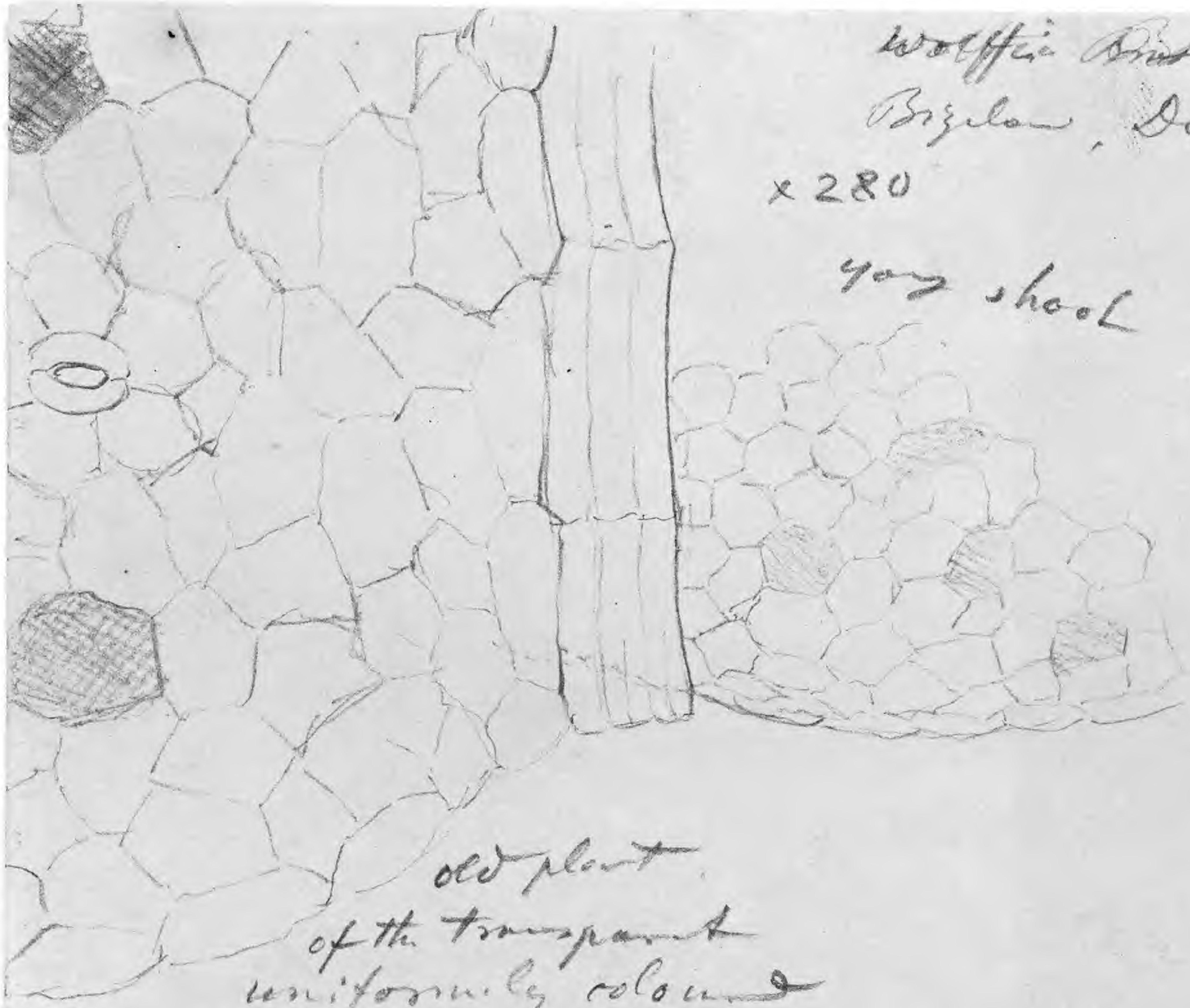
**Druggists**

Cor. Fifth & Market Sts.. St. LOUIS, Mo.

J. McKittrick & Co 36 N. Main St.

Wolffia Brasiliensis Aug 9 1867
Bigelow, Detroit (fresh)

x 280



young shoot

old plant
of the transparent
uniformly coloured
form; see figure
Aug 7 no 1.

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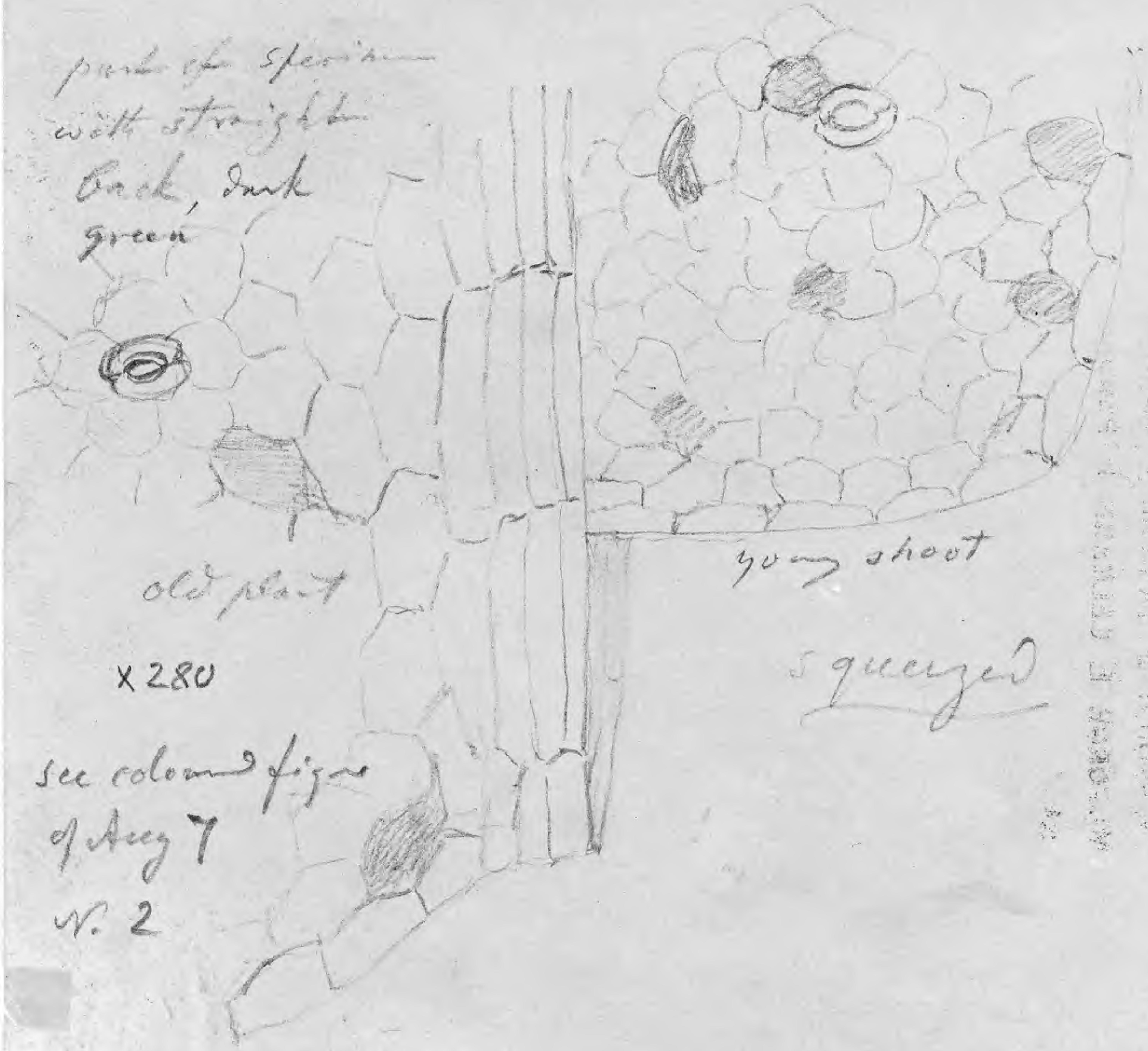
Detroit, Bigelow Aug 9 1867

part of specimen with straight back, dark green


old plant
young shoot
squeezed

x 280

see coloured figure of Aug 7 N. 2

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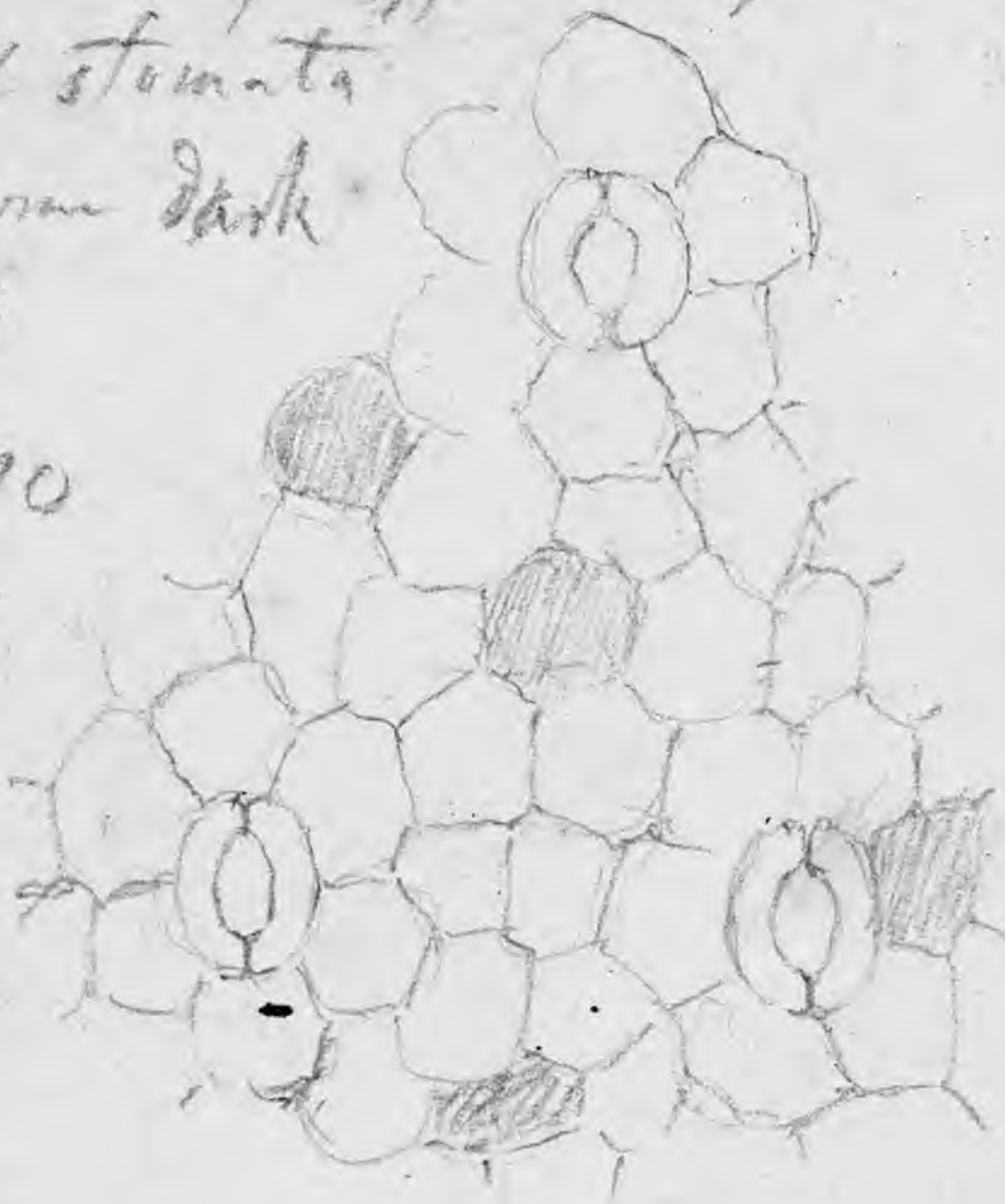
Wolffia Brasiliensis Aug 12 1867

Ontario, Payne ?

Columbiana,
mixed with some W. arrhiza

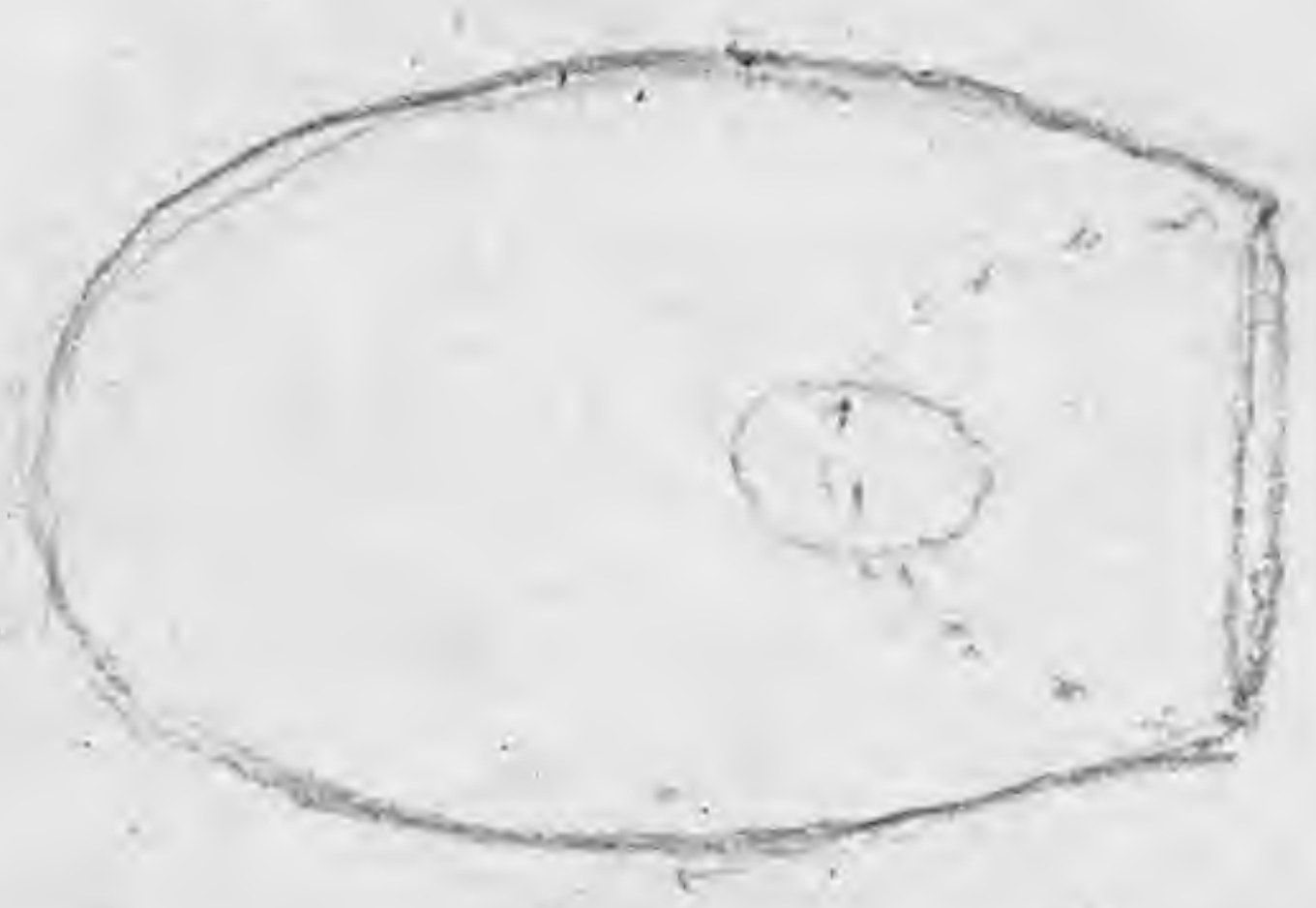
epidermis of upper surface
full of stomata
and some dark
cells

×280



×30

0,7-0.8 mm lg

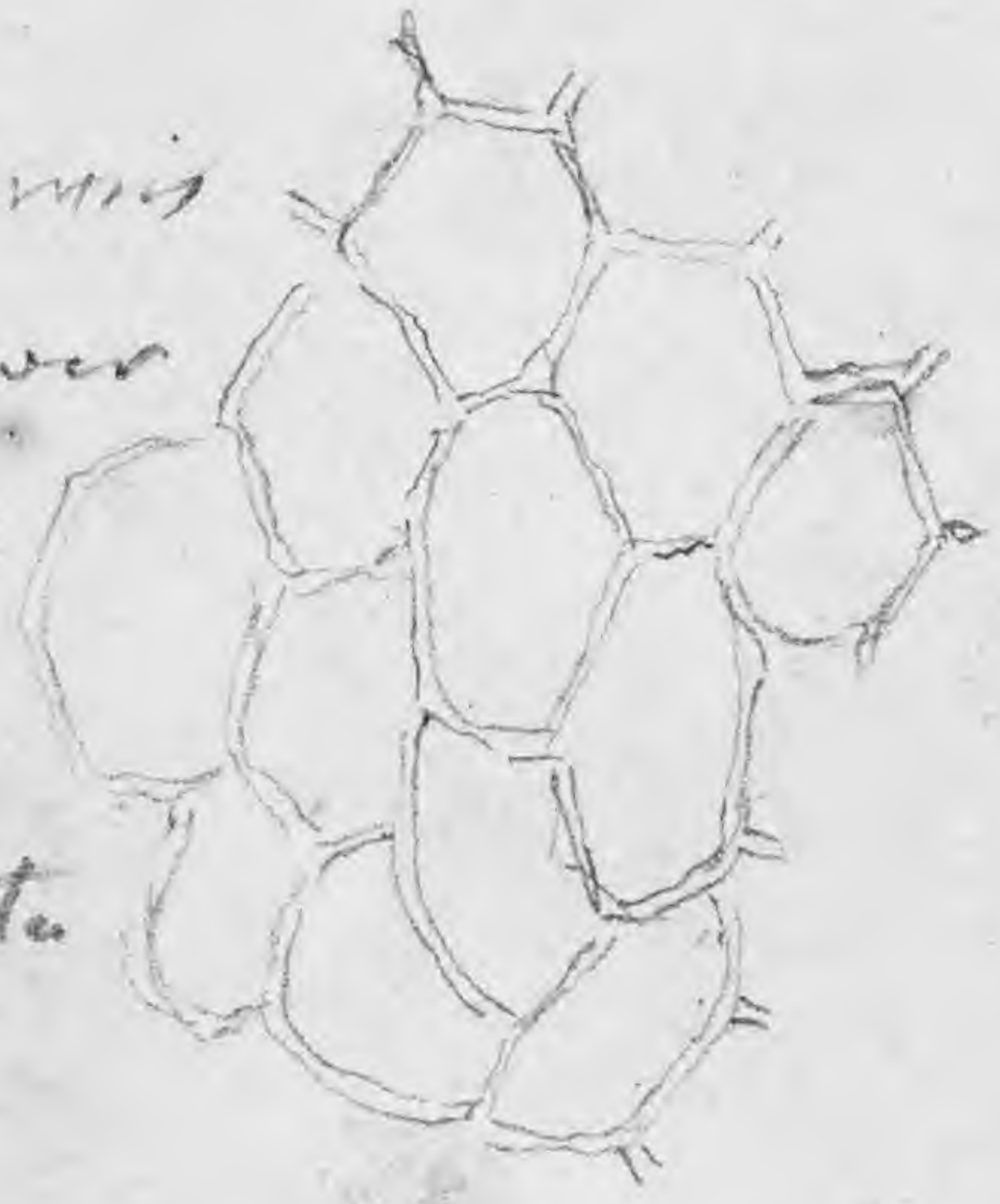


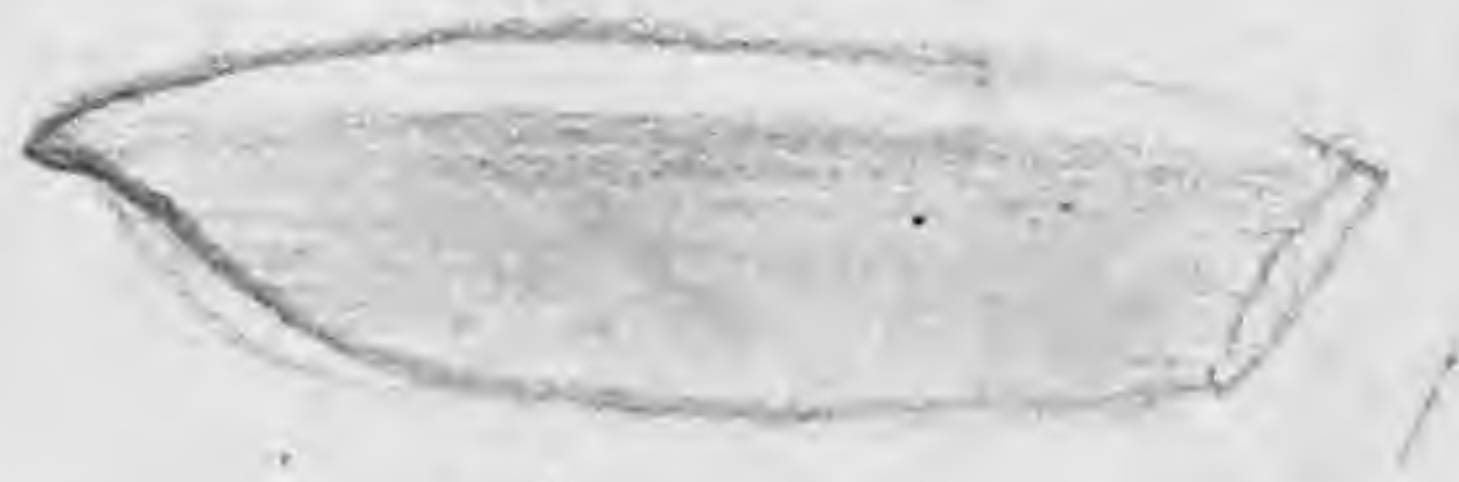
over 50 stomata
on this small
surface
none on the lower

Specimens soaked in water
1 hour, then boiled in dilute
Potash solution, when these
assumed their full shape,
but the W arrhiza remains
somewhat shrivelled.
The shape, the spots, the
size of epidermis cells,
distinguish this greatly
from arrhiza.

epidermis
of lower
surface

no
stomata





side view

this is the (more incomplete ?) flat, colourless
form

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cm
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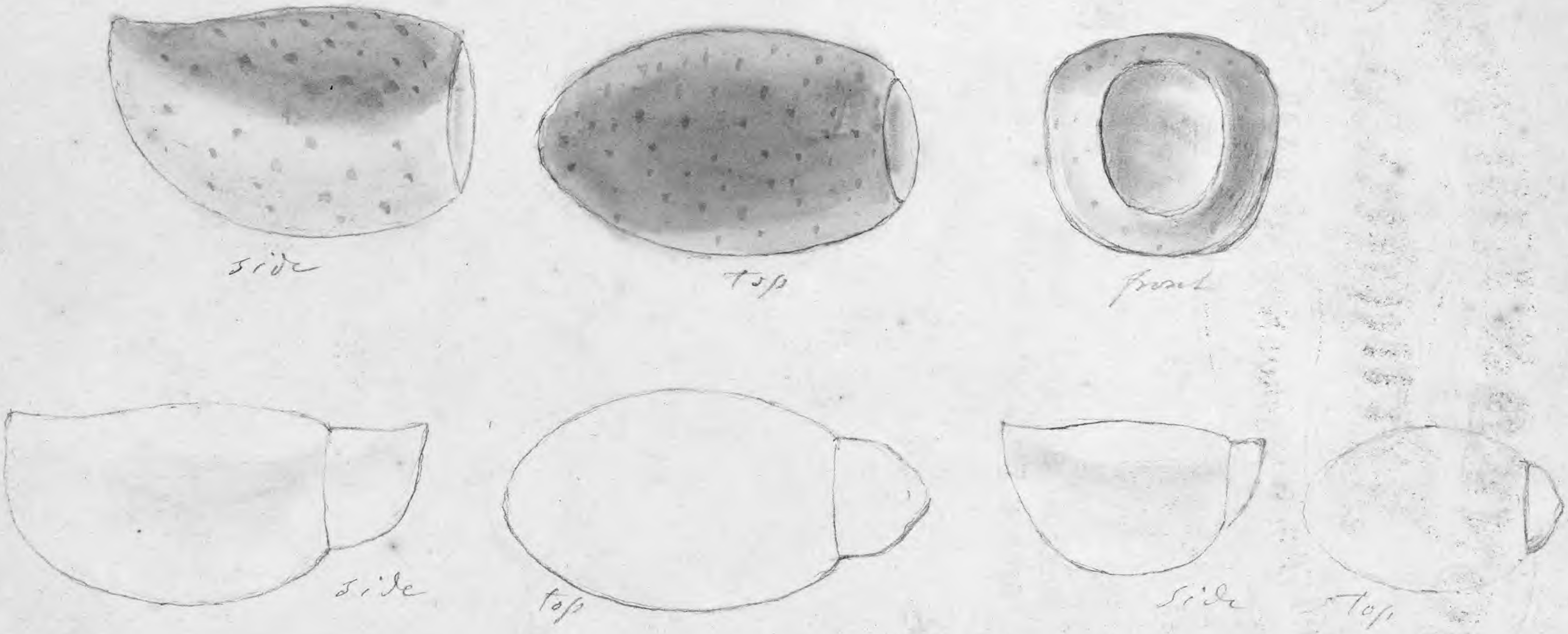
Wolffia Brasiliensis Aug 23 1867

×30 Rivière rouge, Detroit, Dr Bigelow

largest & smallest specimens, send living


side
top
front
side
top
side
top

larger ones $\frac{36 \times 24}{30}$ surface = 1.2 × 0.8 mm

fronds 0.8 – 1.2 mm long

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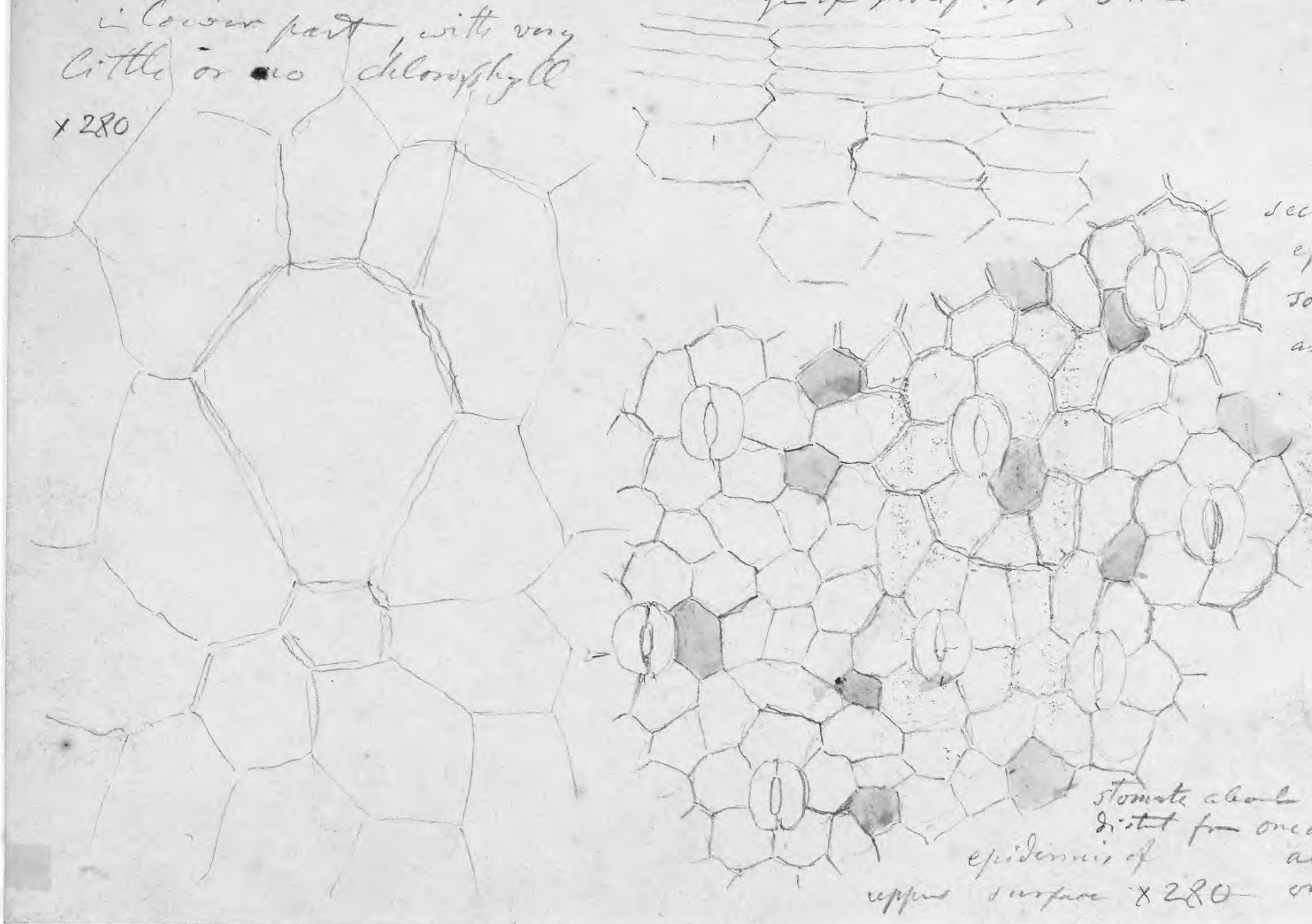
Wolffia Brasiliensis
Detroit

Aug 23 1867

margin of proliferous opening x 280

parenchymatous cells
in lower part, with very
little or no chlorophyll

x 280



the brown colour
seems to be in some
epidermis cells,
sometimes it seemed
as if they were
under the epiderm

cells $\frac{5-8}{280}$ mm diam 0.018-0.028

stomata $\frac{7-8}{280}$ mm long
& thin
=0.025-0.028

stomata about 0.1 mm.
distant from one another; therefore
about 100 stomata
on largest ones

epidermis of
upper surface x 280

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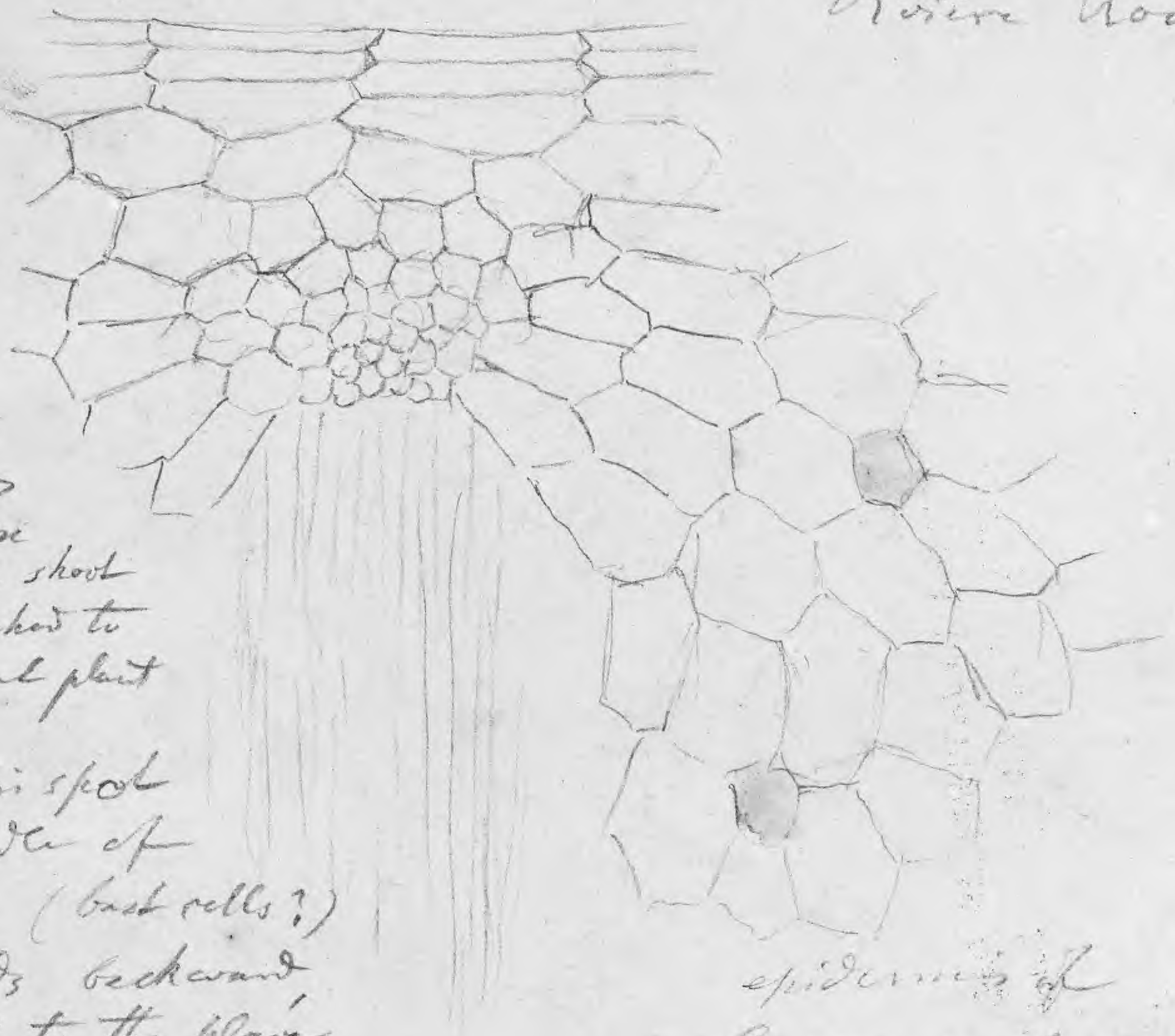
Wolffia Brasiliensis Aug 23 1867
Rivière Rouge, Detroit Bigelow



spot on the lower surface near the proliferous slit on which the shoot was attached to the parent plant

from this spot a bundle of fibres (bast cells?) extends backward probably to the place where the new offspring is being generated (of course the epidermis is here removed)

epidermis of lower surface

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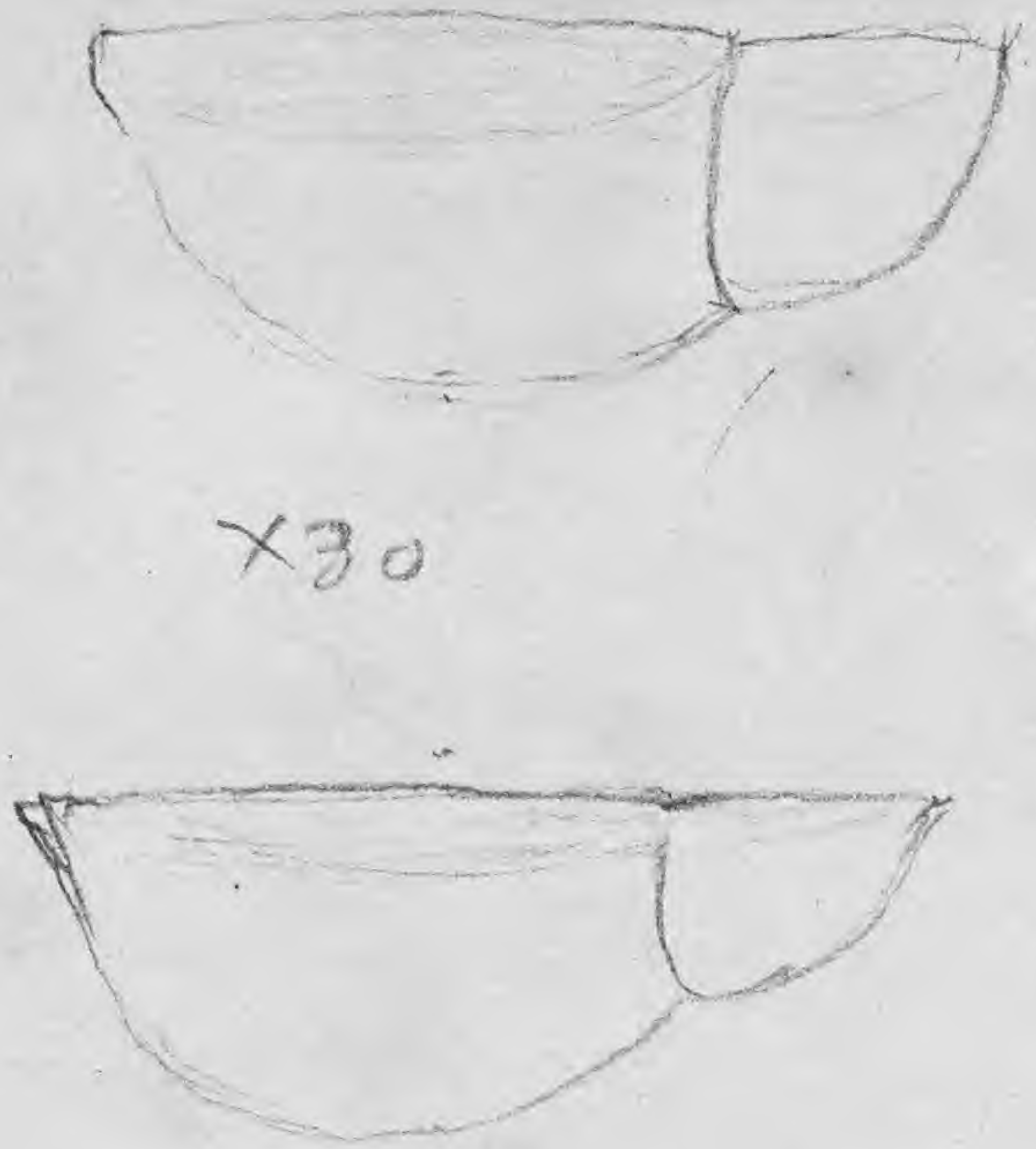
W. Brasiliens. Sept 10 1867

E Hall mixed with W. Columbiana

largest plant without bud 0.9 mm long



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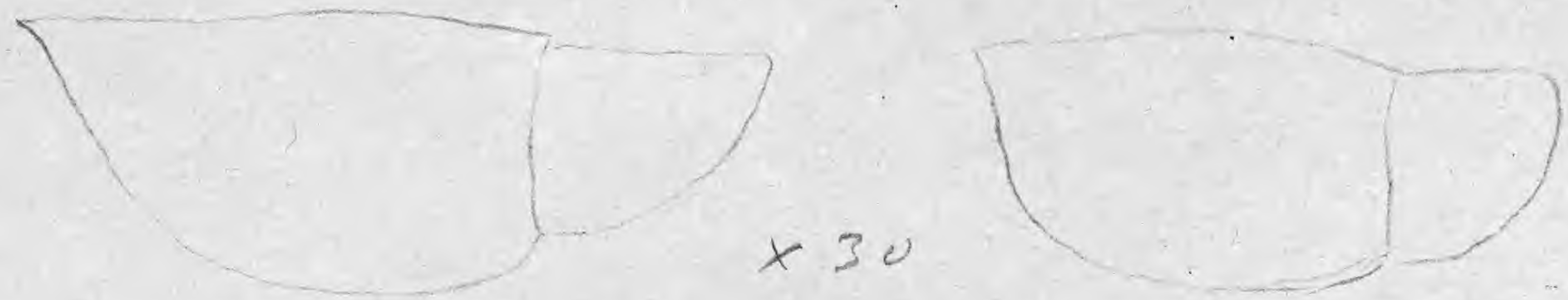
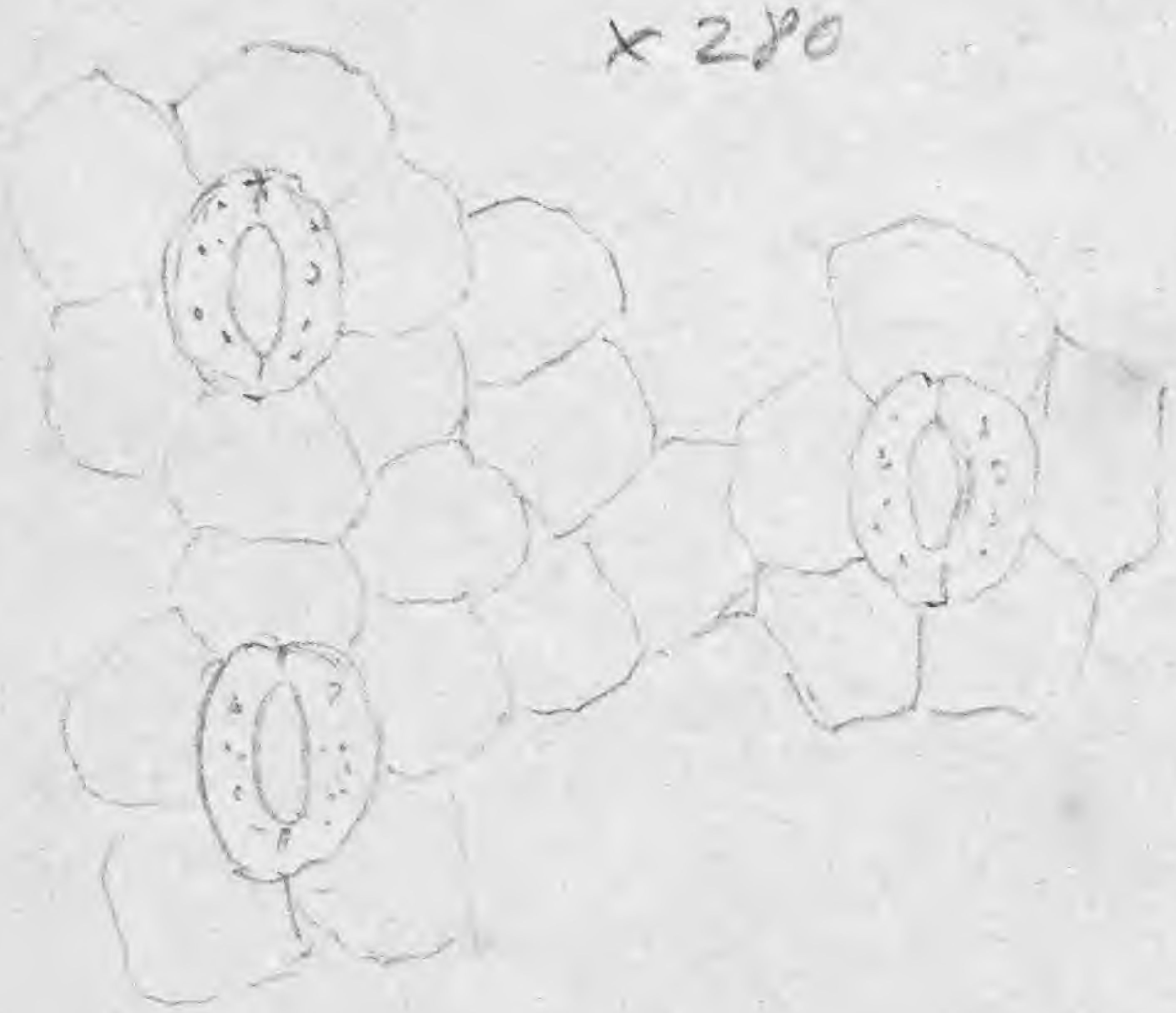
Wolffia Brasiliensis Sept 21. 1867
Athens, E. Hall





most specimens are without the brown dots — these seem to develope more in old, almost decayed, palish specimens. Evidently the brown cells are not of specific importance

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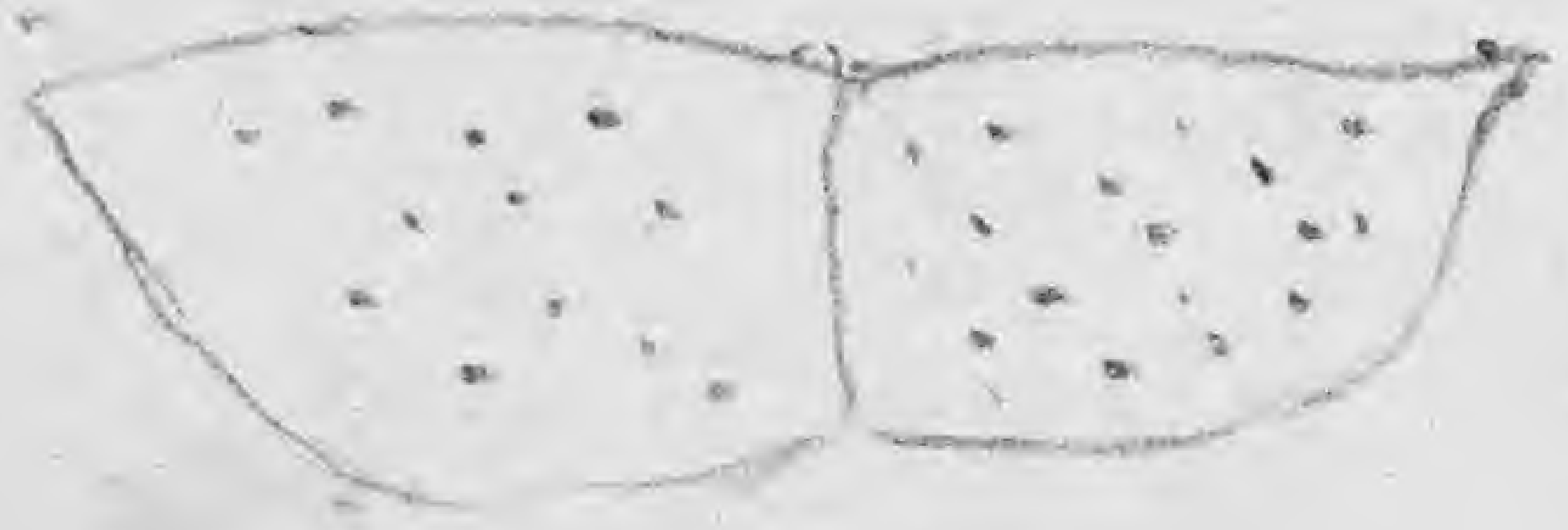
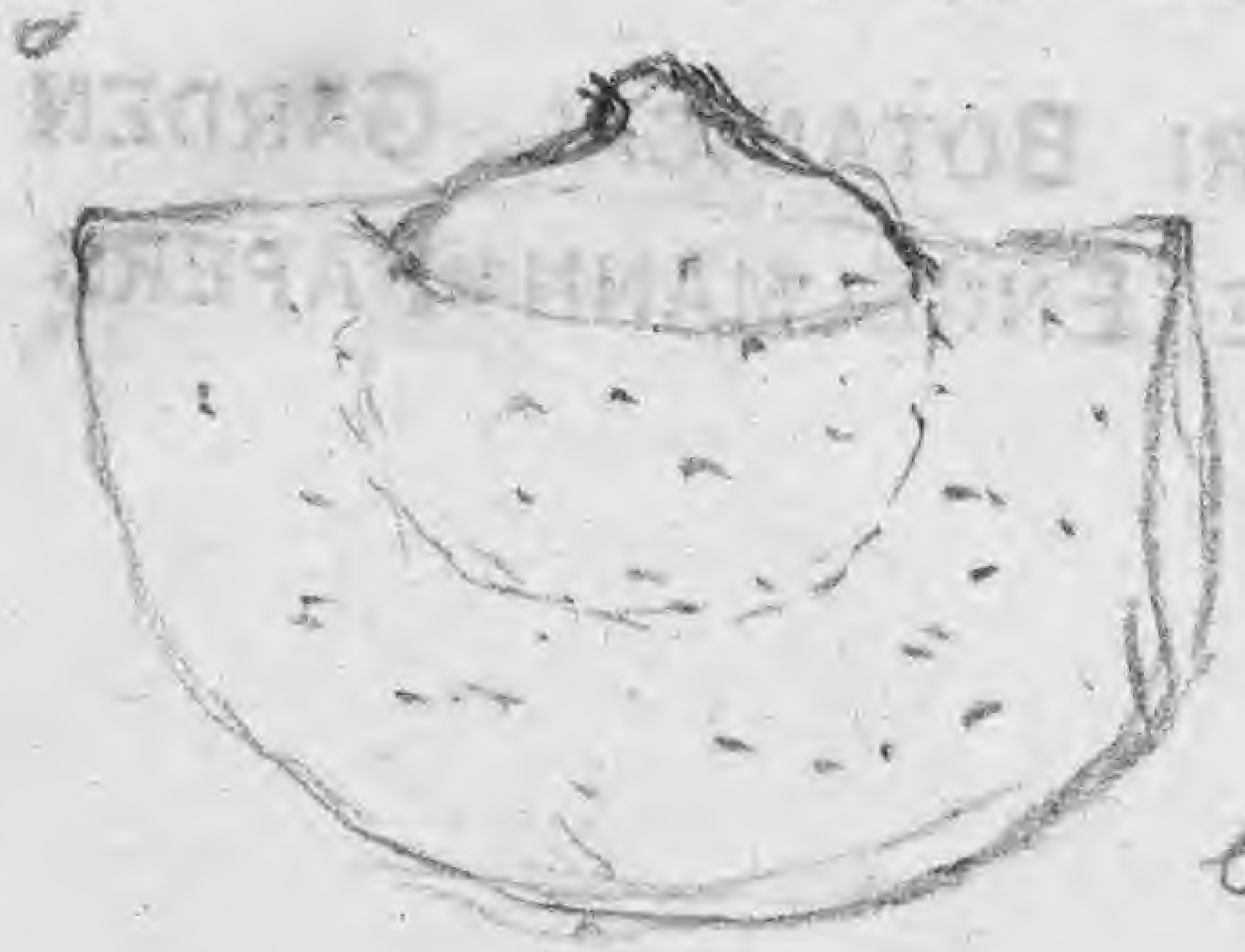
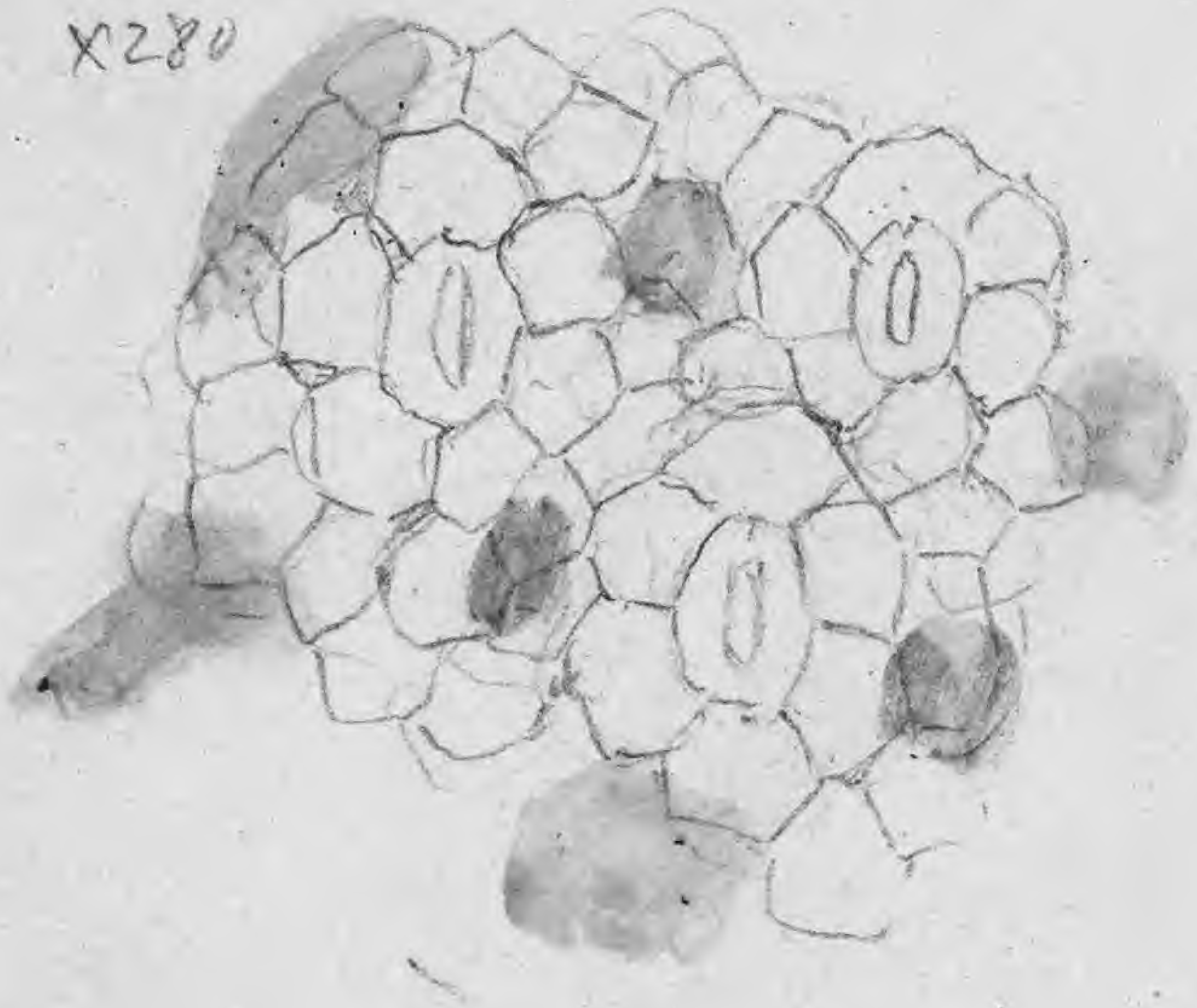
Wolffia Brasiliensis Nov 7 1867

Weddell leg 1845

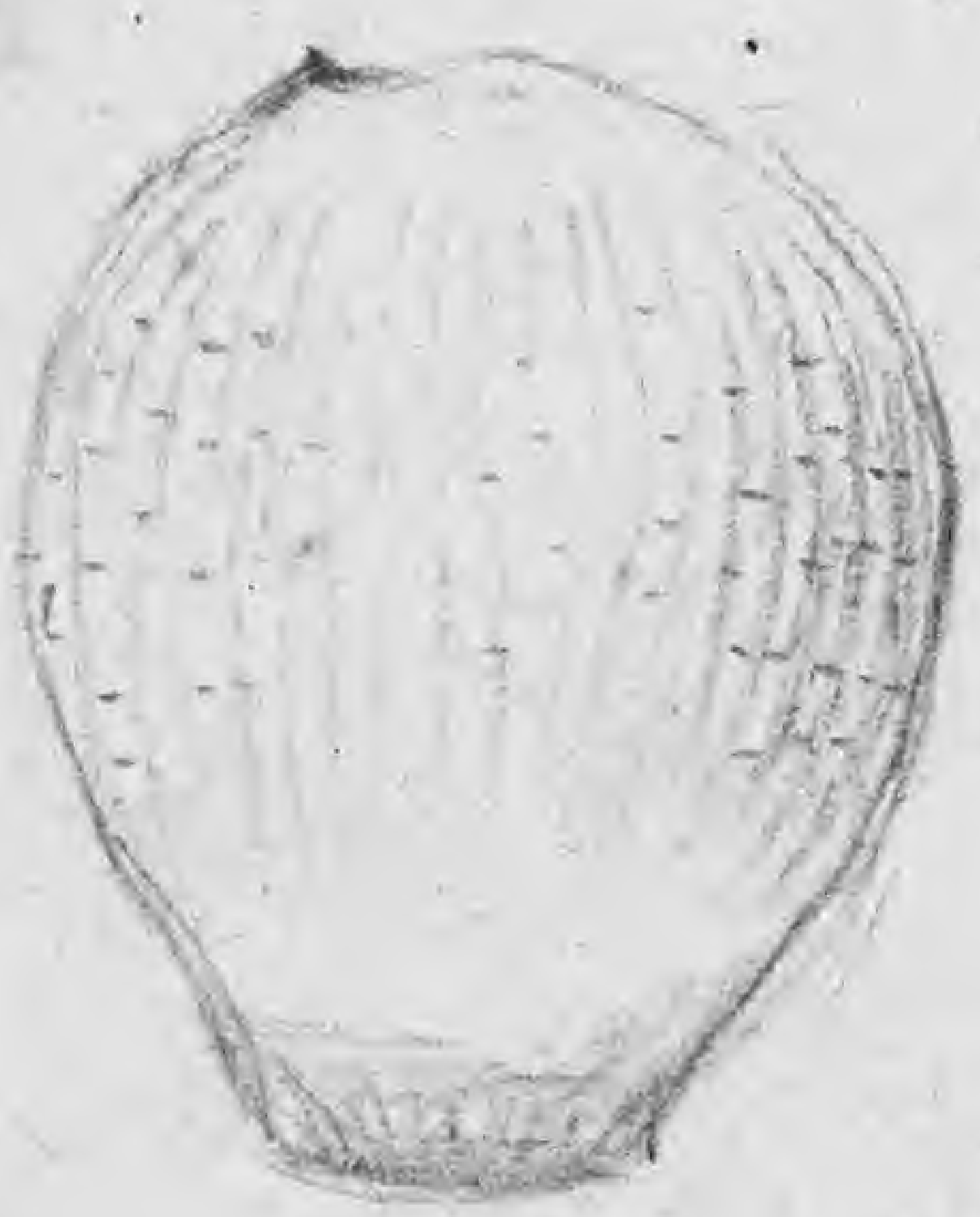


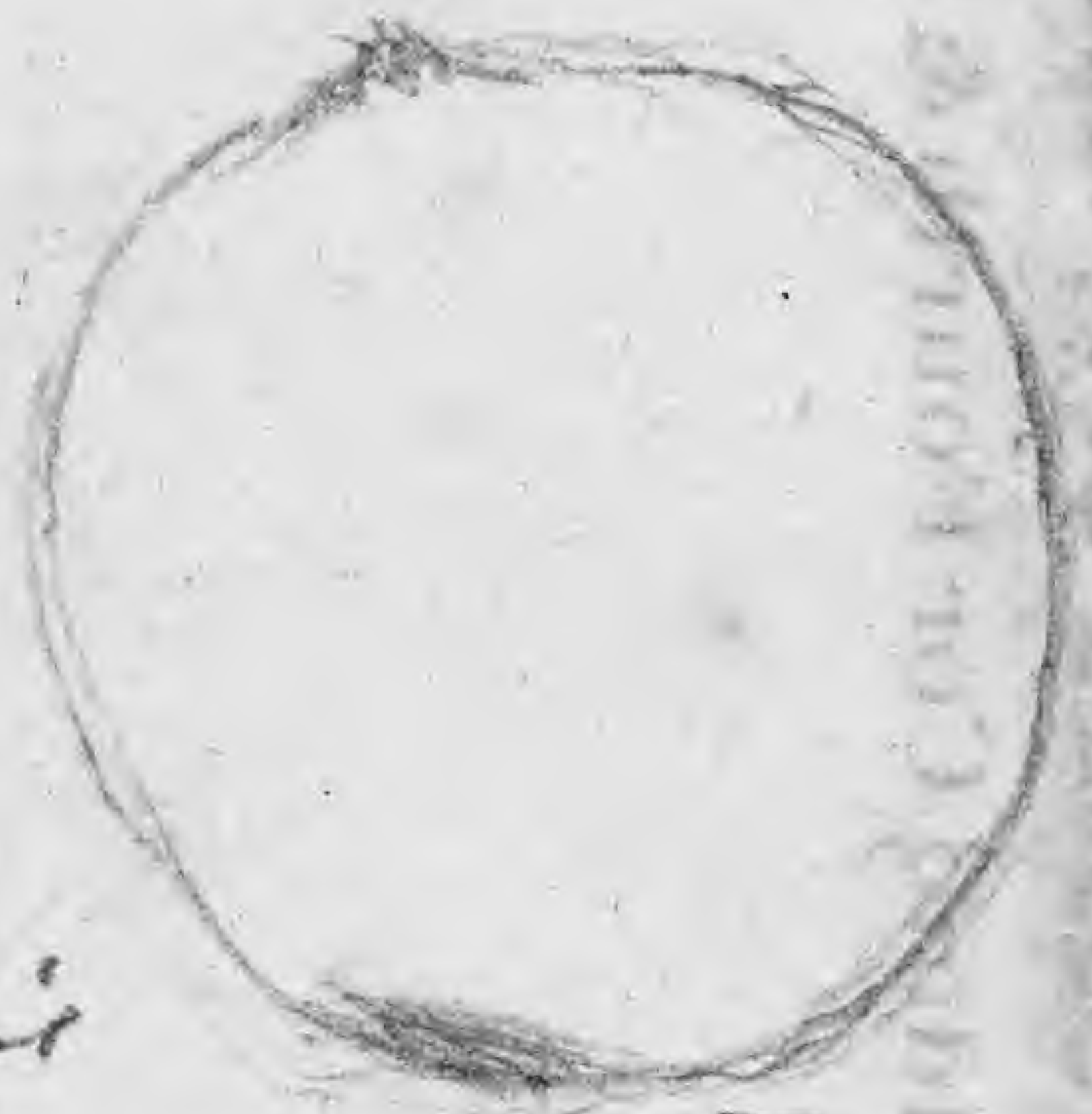

x30
soaked
largest

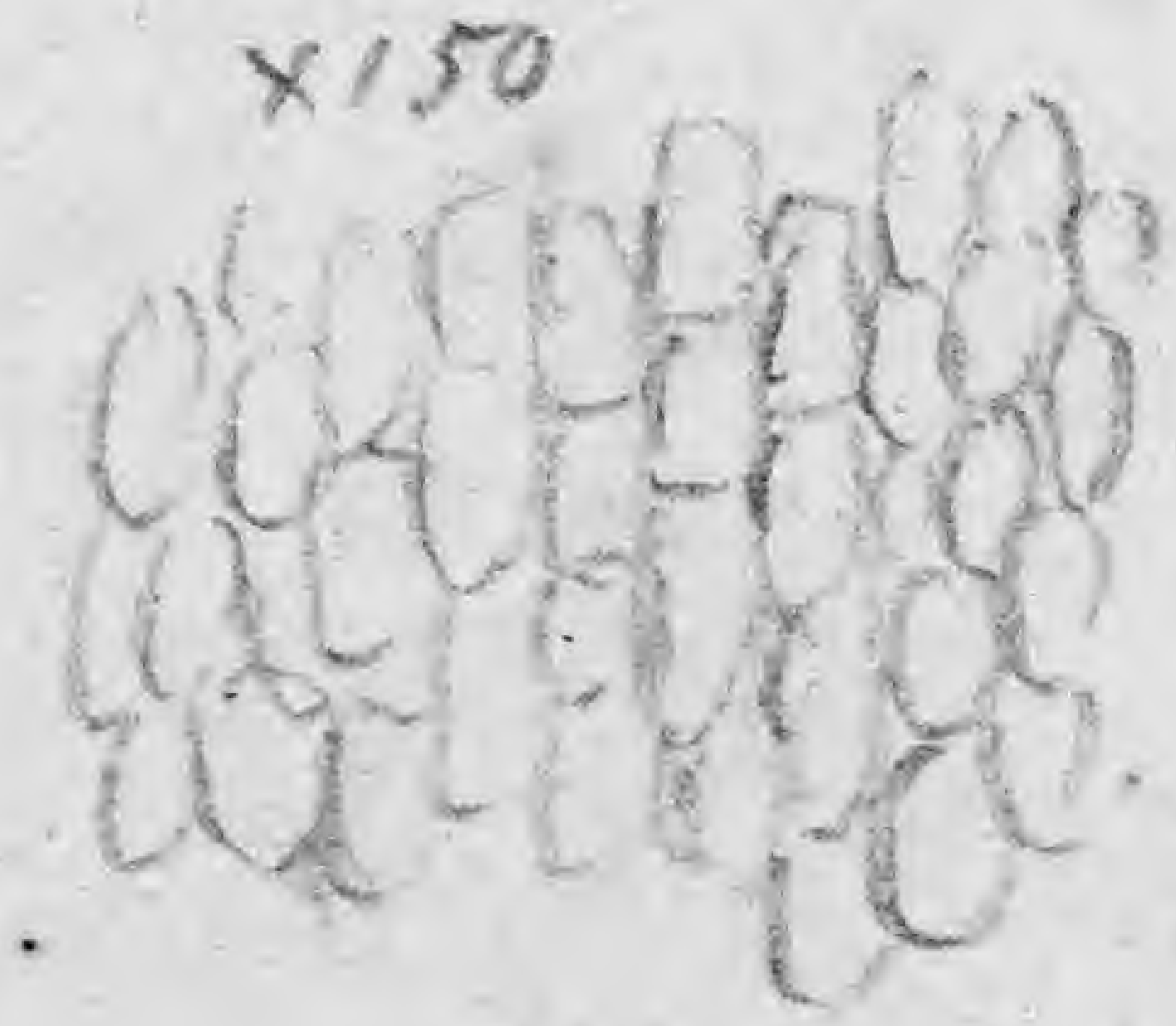


Stomata $\frac{6.5 - 7.5}{280}$

$= 0.023 - 0.026$ mm




same soaked
fruit


x150
surface

7843

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Walp. Ann 3. p. 496

Wolffia Brasiliensis Weddell, Ann. sc. nat.
3 Ser. 12. 169 t. 8

Frondibus ovatis solitariis geminisque epidermide nodulis punctiformibus inspersa, rima basilari inappendiculata.

On the Paraguay River, central
describes & Brazil.
Weddell (figures?) there also
W. Michelii Schleid
& W. Delilii Schleid.

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7844

ENNO SANDER & CO.,
PHARMACEUTISTS,
Cor. 4th & Walnut, under Southern Hotel,
Cor. 2d & Walnut, under Barnum's Hotel,
ST. LOUIS, MO.

7845

Wolffia Columbiana

31-6

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mean.... | 10.1 | 11.6 | 8.6 | 7.4 | 8.2 | 9.0 | 9.2 | .... | ...... |

2.—*Monthly mean of Temperature, Fahrenheit.*

MARCH.

| YEAR. | AT 6 A. M. | 9 A. M. | 12 M. | 3 P. M. | 6 P. M. | 9 P. M. | MEAN OF MONTH. |
|---|---|---|---|---|---|---|---|
| 1861 | 37.1 | 41.1 | 48.2 | 51.6 | 47.6 | 43.4 | 44.8 |
| 1862 | 36.0 | 40.1 | 46.9 | 48.0 | 45.6 | 42.5 | 43.2 |
| 1863 | 36.7 | 40.9 | 47.5 | 49.5 | 46.1 | 42.3 | 43.6 |
| 1864 | 34.1 | 38.7 | 44.6 | 45.9 | 42.2 | 38.6 | 40.7 |
| Mean | 36.0 | 40.2 | 46.8 | 48.7 | 45.4 | 41.7 | 43.1 |

APRIL.

| YEAR. | AT 6 A. M. | 9 A. M. | 12 M. | 3 P. M. | 6 P. M. | 9 P. M. | MEAN OF MONTH. |
|---|---|---|---|---|---|---|---|
| 1861 | 49.6 | 56.5 | 62.7 | 65.1 | 59.8 | 55.1 | 58.1 |
| 1862 | 46.5 | 53.3 | 59.5 | 60.8 | 57.6 | 52.3 | 55.0 |
| 1863 | 47.3 | 55.7 | 62.9 | 64.4 | 60.0 | 54.4 | 57.4 |
| 1864 | 45.0 | 50.8 | 55.3 | 56.6 | 54.1 | 49.5 | 51.4 |
| Mean | 47.1 | 54.1 | 60.1 | 61.7 | 57.9 | 52.8 | 55.5 |

in the London In-
te , in reviewing Admiral Fitzroy's Weather Book, thus writes of Atmospheric Perturbations:

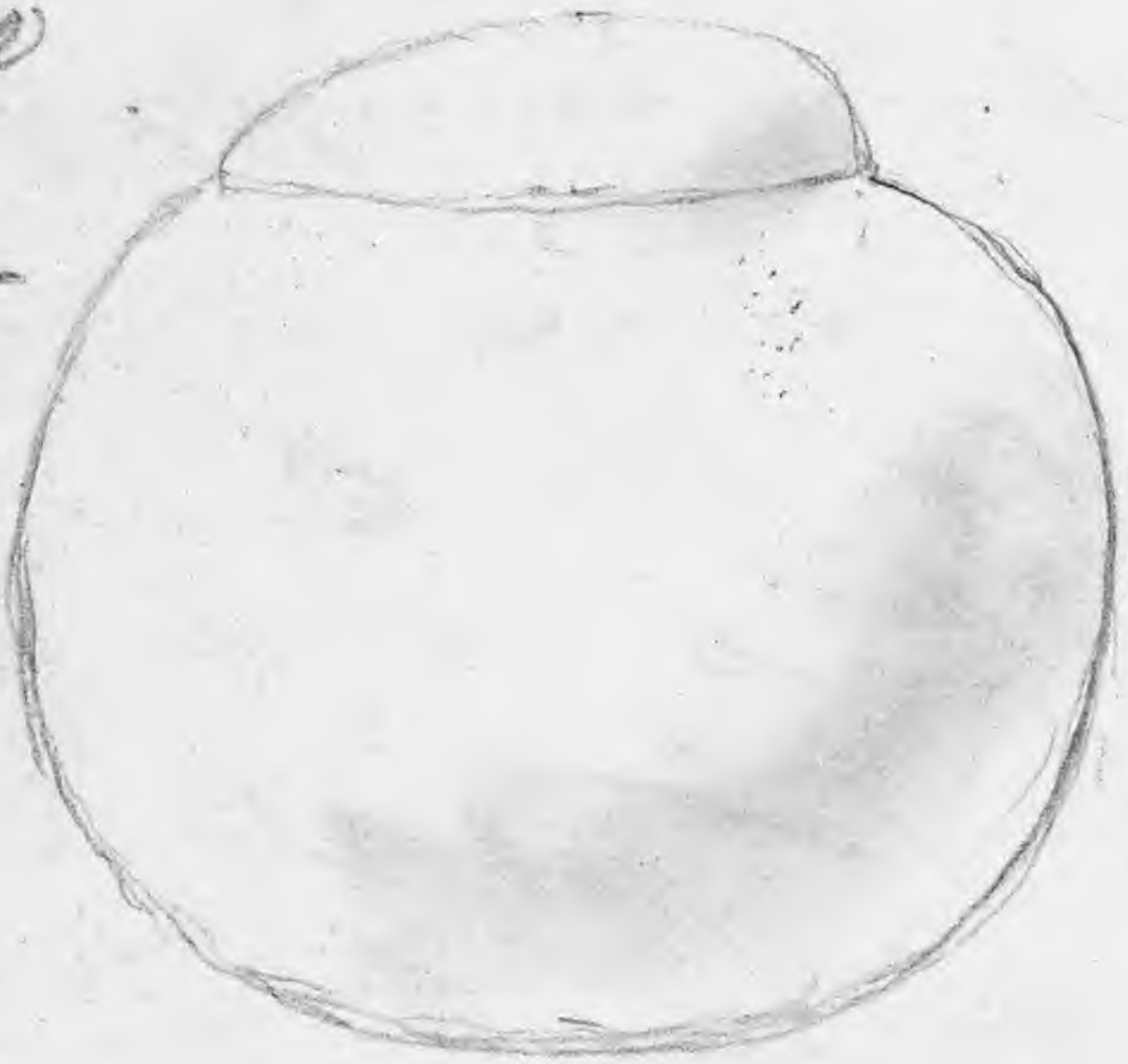
The earth's atmosphere is divisible into two portions, lower and upper—the *stable* and the *instable*. It is not meant that absolutely no motion or change takes place in the upper division, but all the phenomena of winds and storms occur in the lower one, as explained in a former number. Opinions differ as to the total height to which the atmosphere extends. Admiral Fitzroy supposes that "as air, from ten to twenty miles seems a probable total depth," while about seven miles seem to be the limit in which man can exist. We do not perceive precisely what the Admiral means by the phrase "as air," but he may agree with the opinion of Quetelet, that the composition of the atmosphere may not be the same at great elevations, where the pressure becomes infinitesimal. However this may be, we do not coincide with his view that the total height is less than is usually supposed, but prefer the opposite supposition of the distinguished Belgian philosopher. Still, so far as relates to weather prognostications, our researches must be chiefly devoted to what takes place within a few thousand yards of the earth's surface; and if the loftier regions—in which miles of elastic matter in the gaseous form contribute next to nothing to the total weight of the atmosphere, as shown by the barometric tube—should ultimately be found to exert a noticeable influence upon the perturbations of the lower layers, it will probably be on account of the magnetic disturbances of which Quetelet conceives them to be the scene. The instable portion of the atmosphere is much lower in winter than in summer; but even when its volume, and consequent height, is enlarged by the action of solar heat, it can not reach much above the highest mountain top. The chief cause of air currents or winds is undoubtedly

Wolffia Columb
in pond at sawmills above Mound (old quarry)
with sawlogs — mixed with Lemna minor & polyrhiza

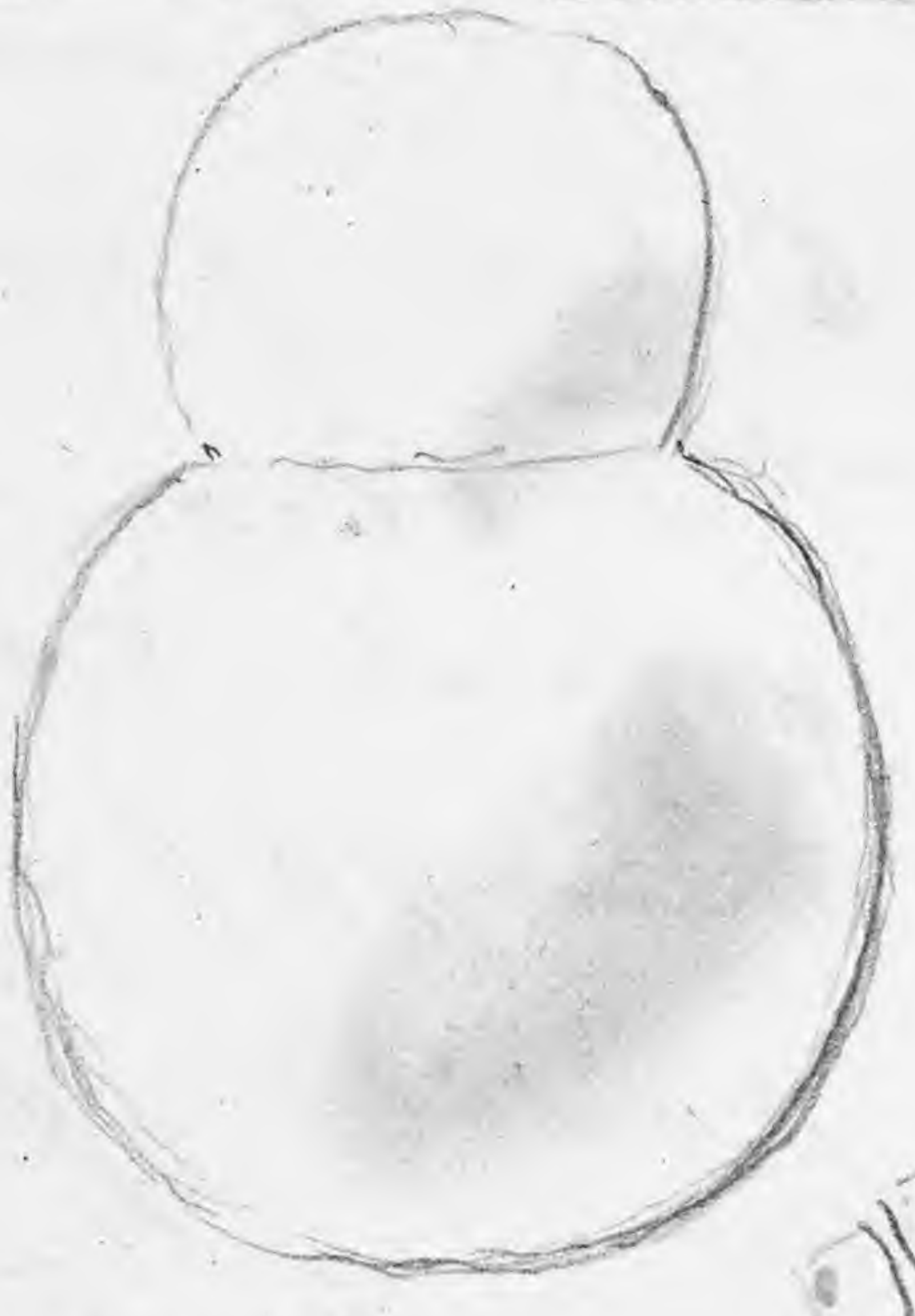
July 3 1867

X30

globular

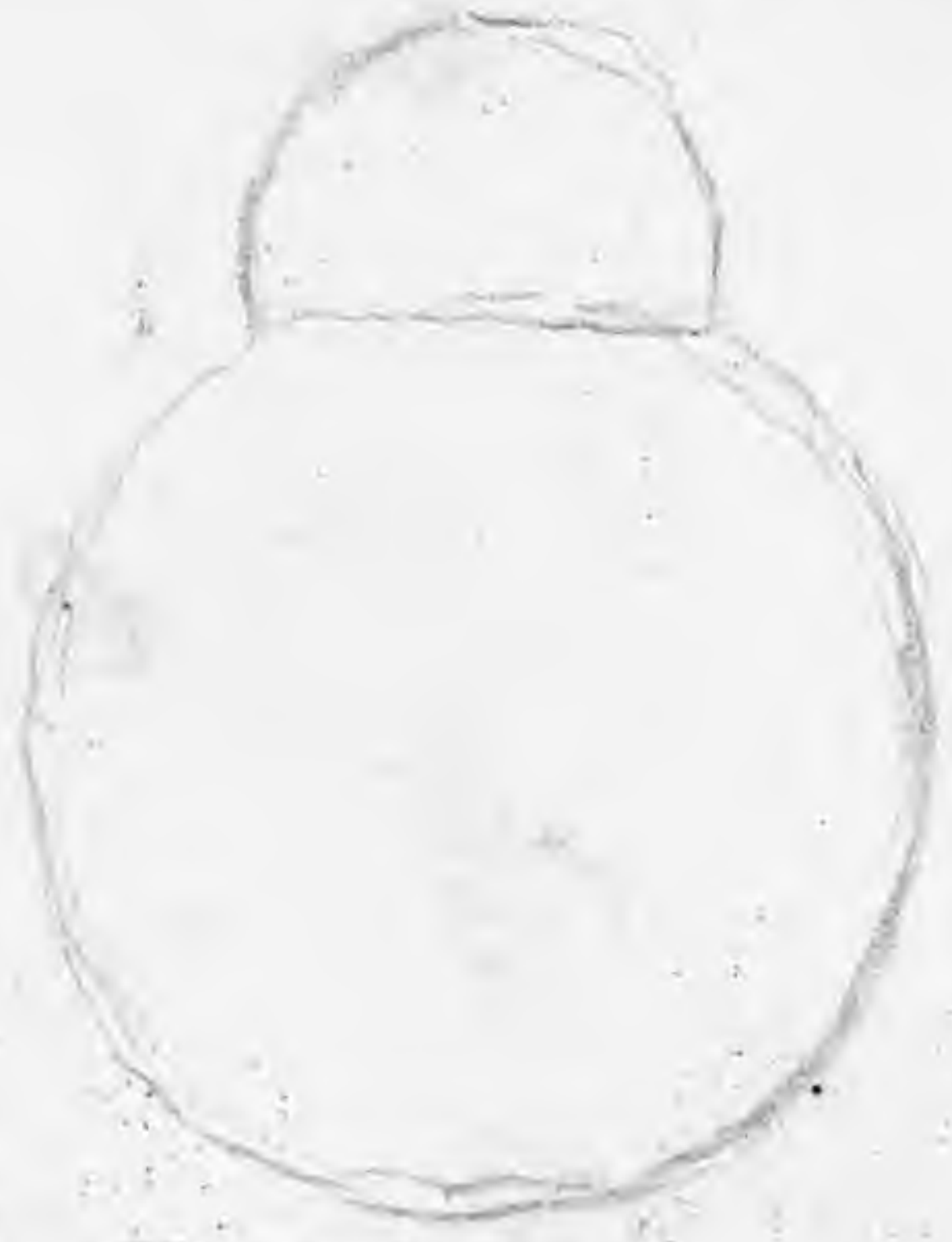


largest seen

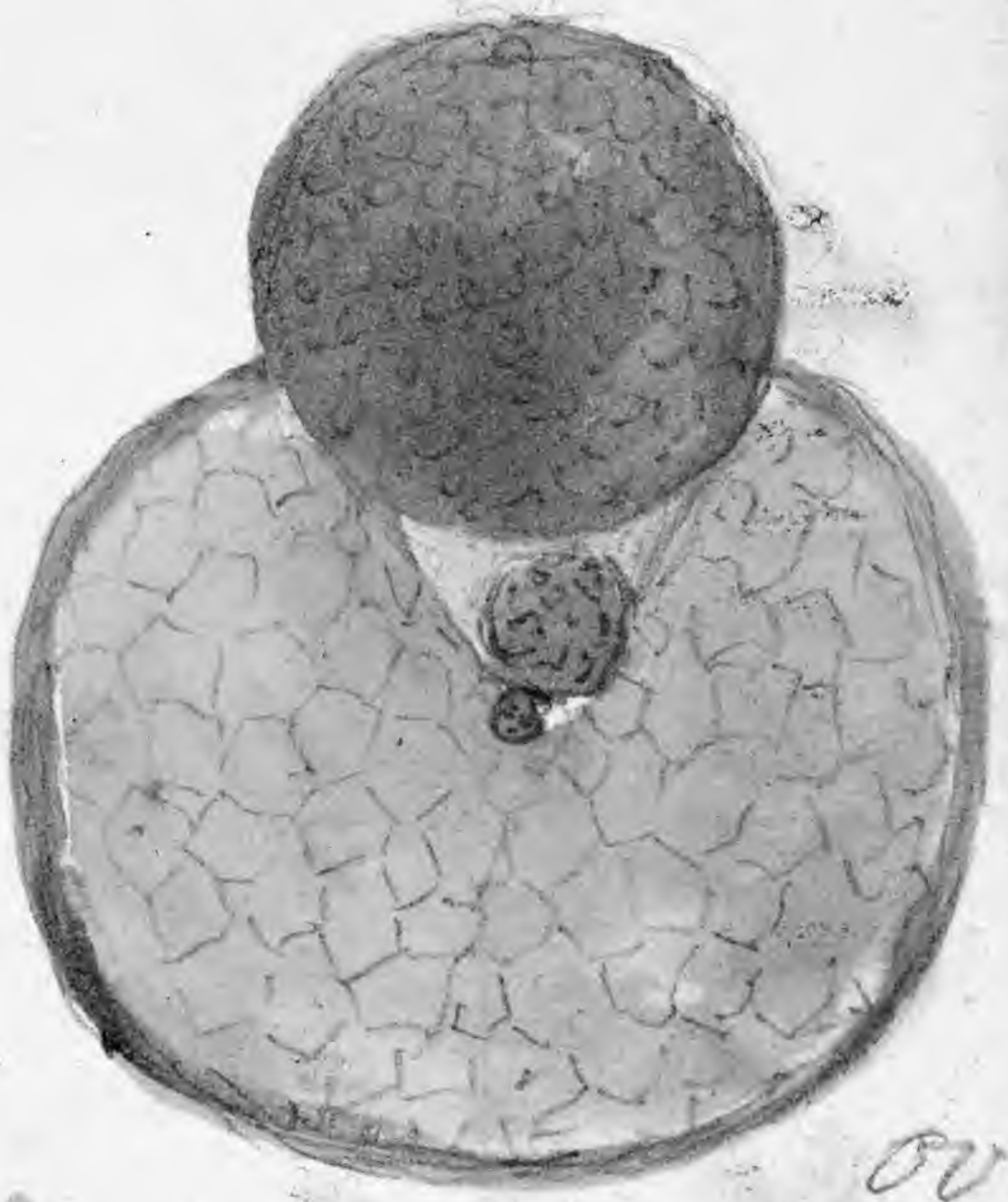


usual size

smallest seen

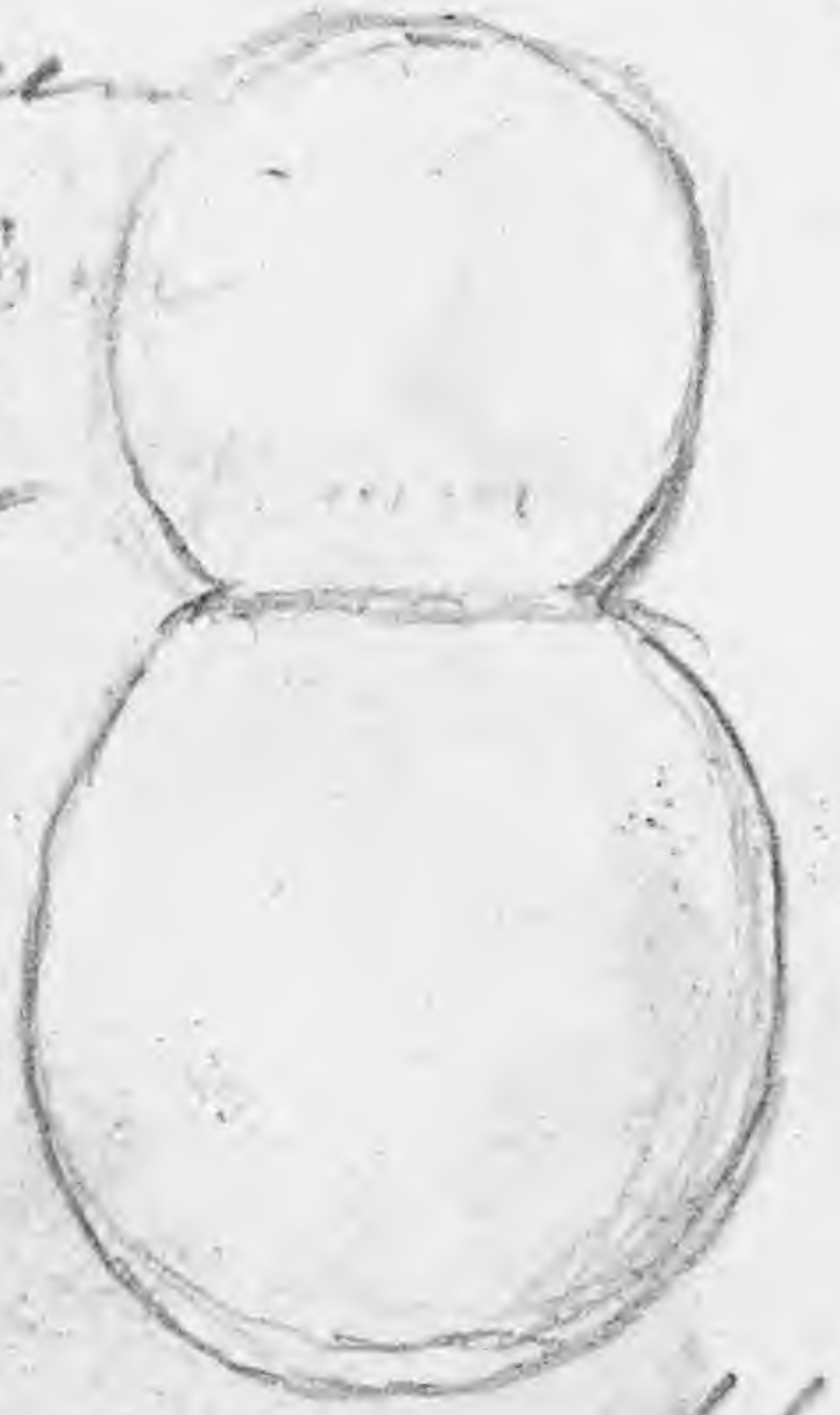


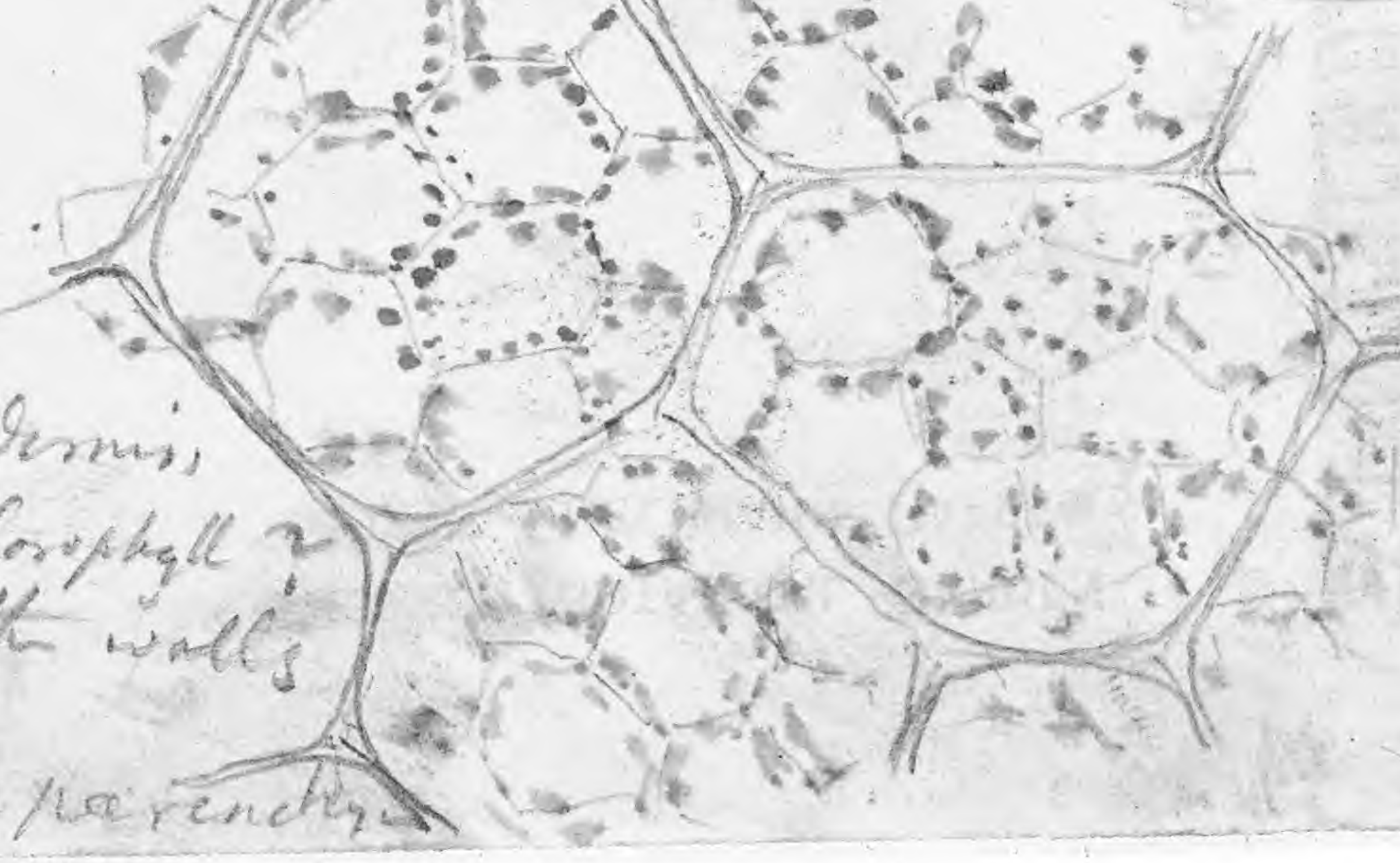
section



Over

diamet 2/3 to 1 1/2 mm
usually about
1 mm





only epidermis with chlorophyll & along the walls

no chlorophyll in parenchy—

parenchy— & epiderm cells
X 280

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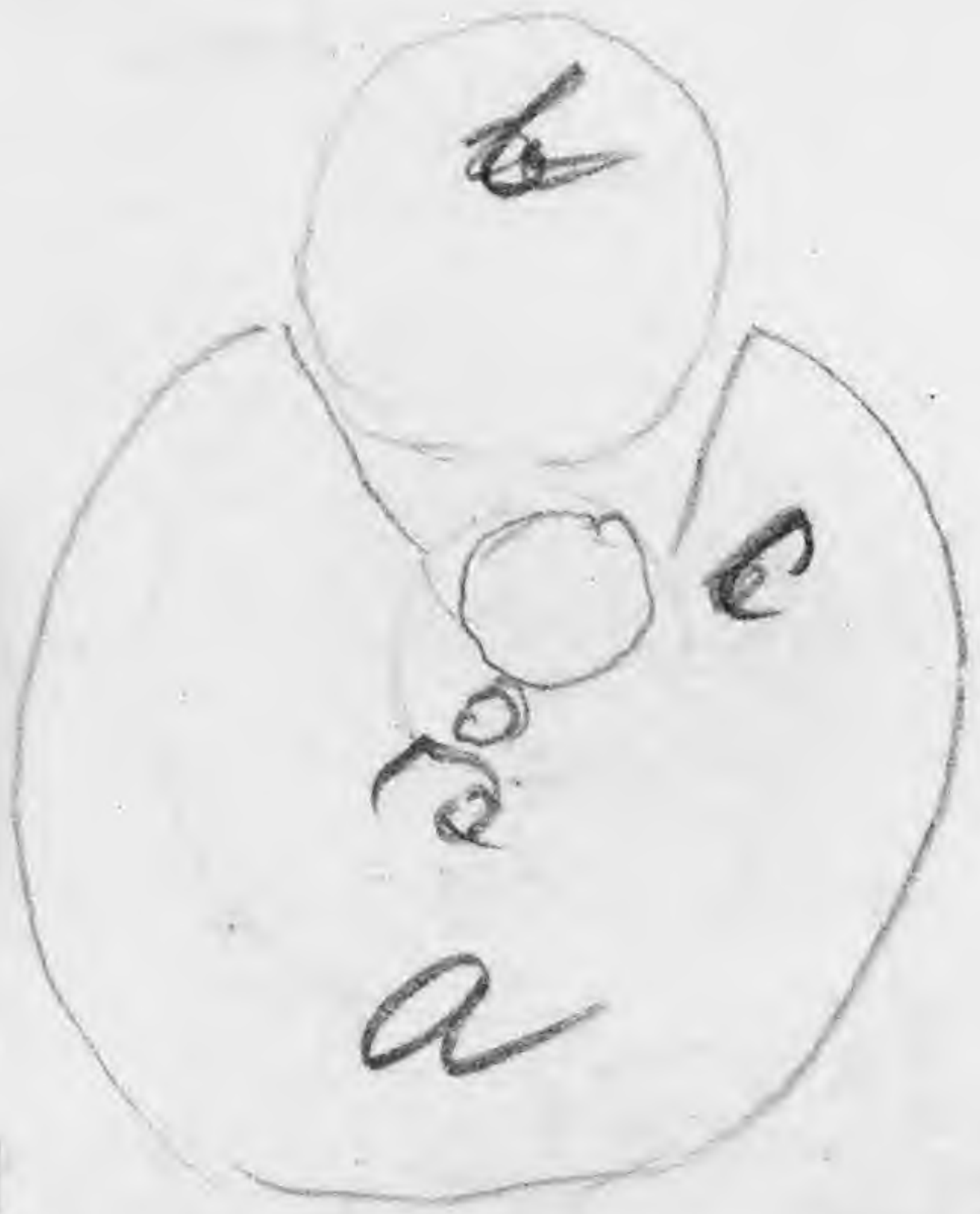
**APOTHECARY & CHEMIST,**
Cor. 4th & Olive Sts., St. Louis.



several careful sections show, that b, the first bud, emerging from the circular rima, is not attached to c that c is not the offspring of b, but of the parent plant; whether it belongs to c or to a, I have not seen, but there can not be a doubt but that it belongs to a also.

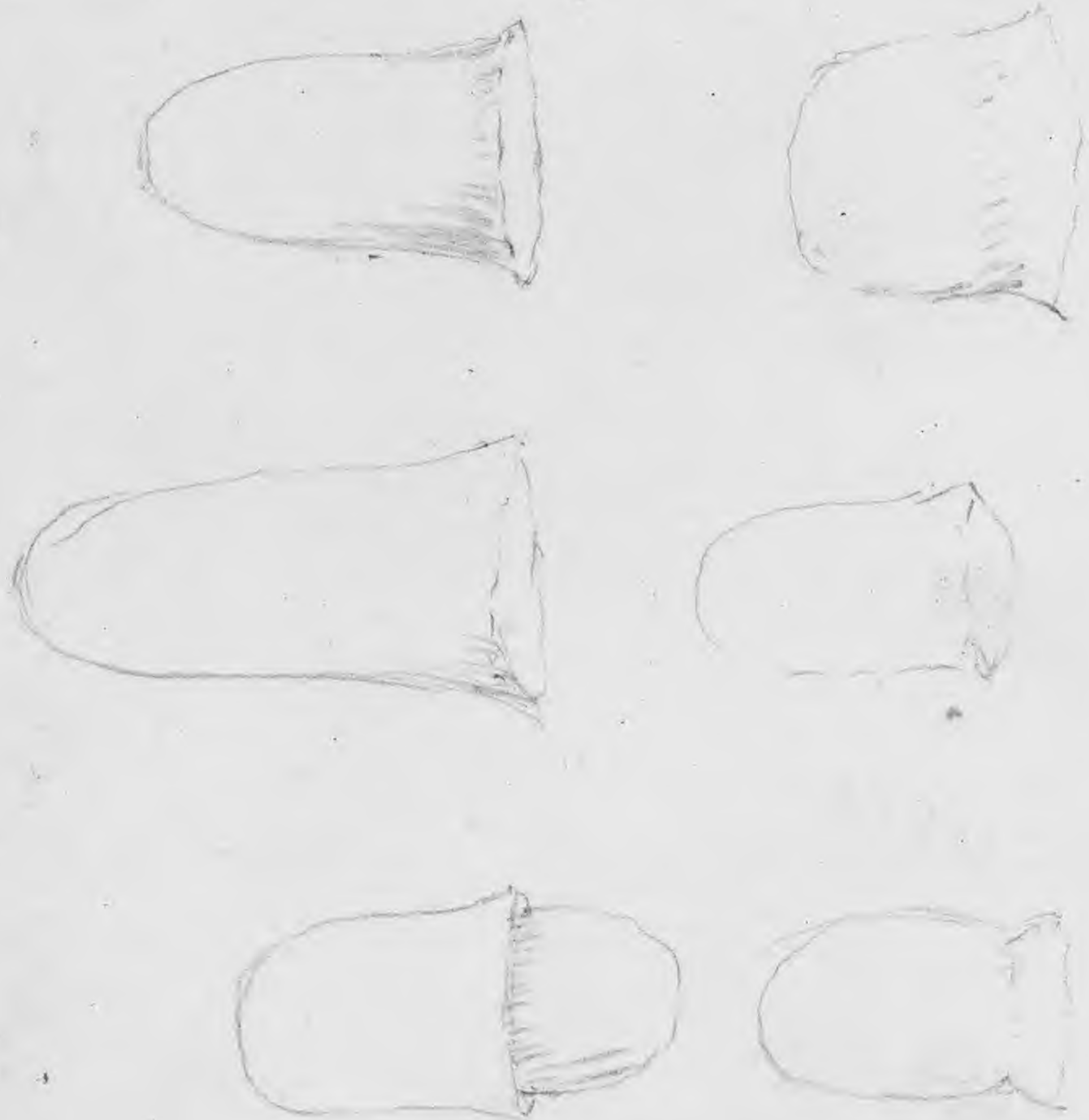
9482

Wolffia Columbiana July 4 1867

Austin? or Payne?

poorly soaked - not good

soaked x 30



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0.018 0.025 0.028 7847

280/40 5/7143 7/1000 8/1143

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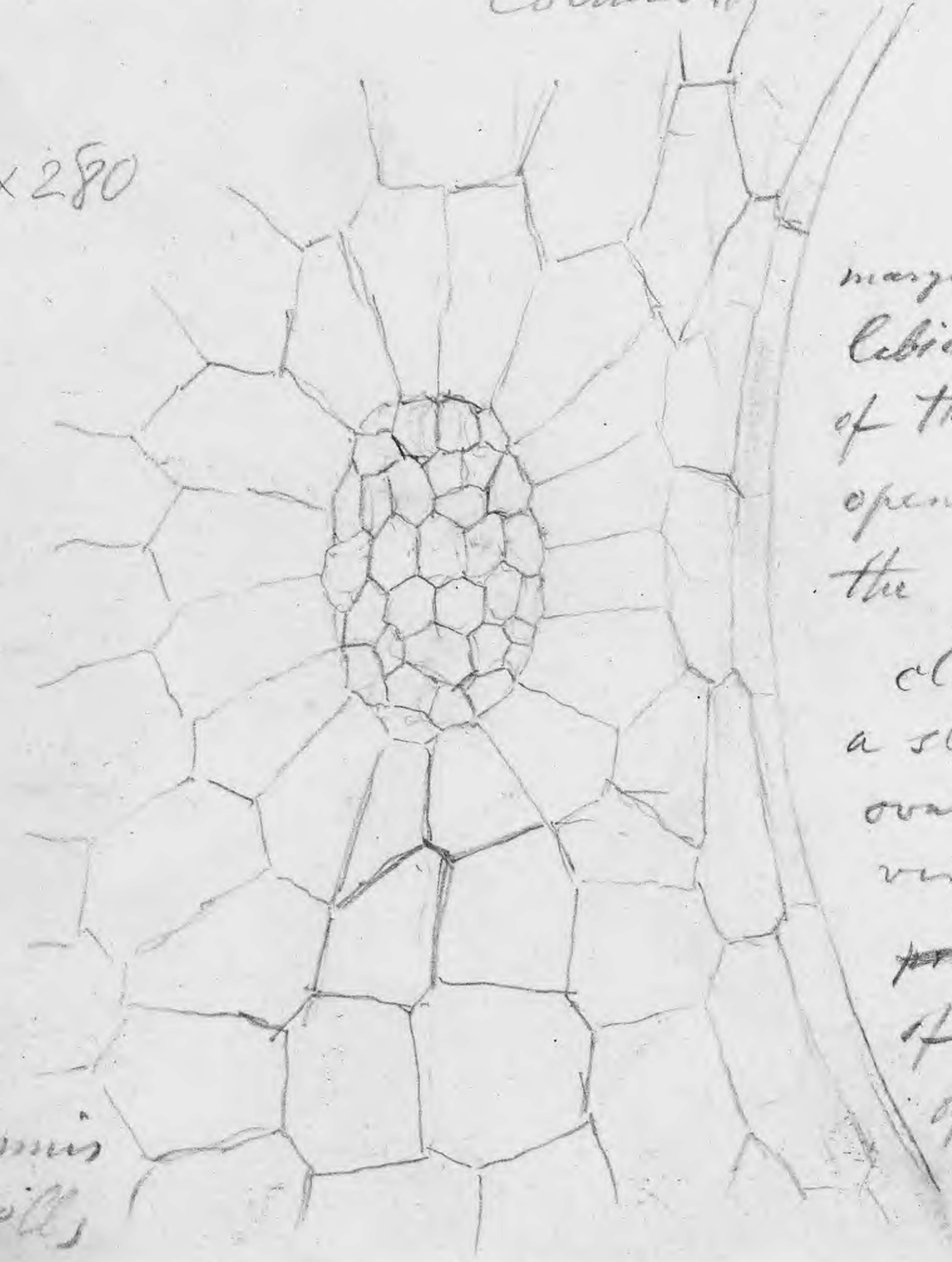
Wolffia ~~arrhiza~~
Columb.

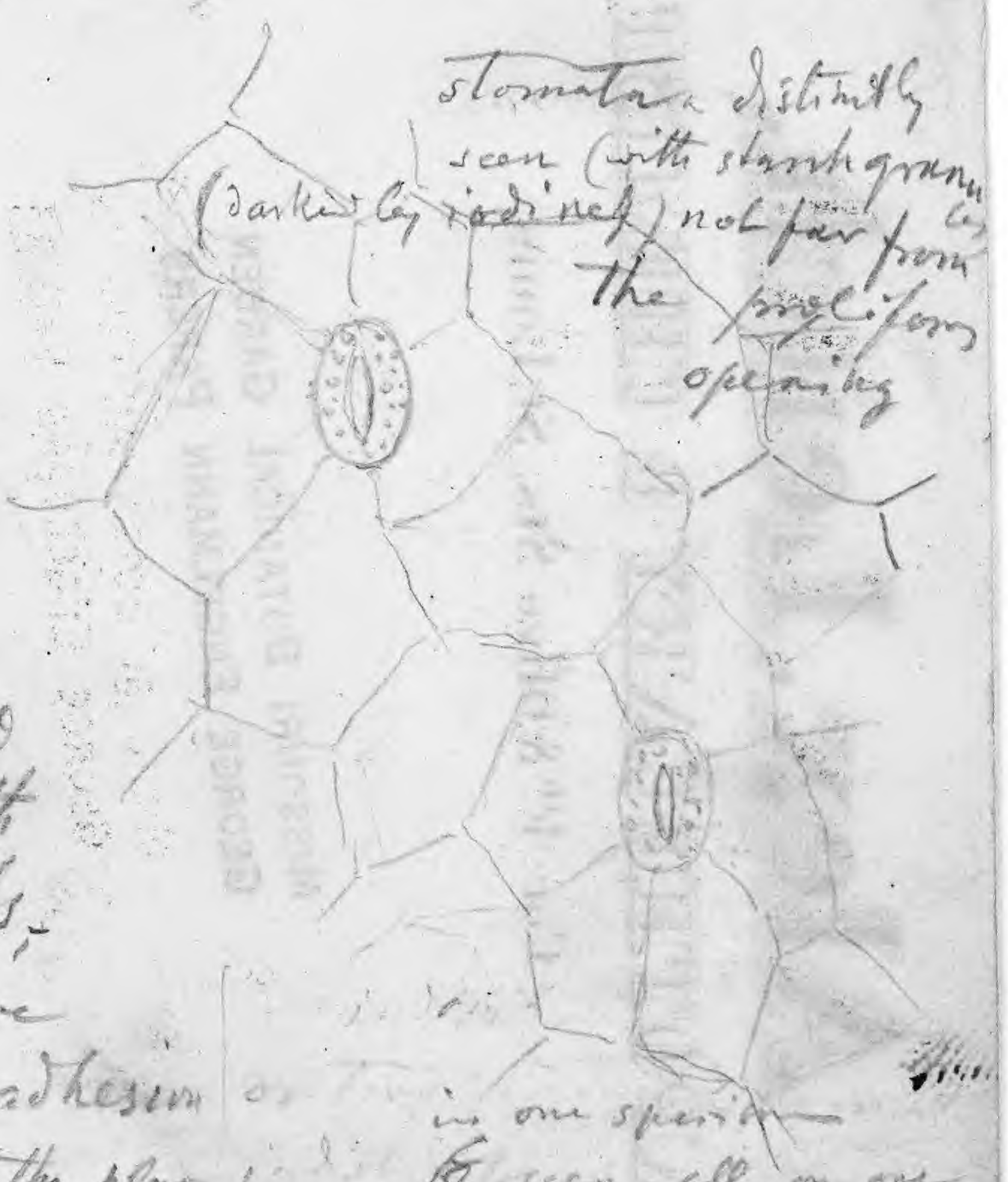
St Louis

July 5 1867

decolorized by ether



margin or
labium
of the circular
opening for
the proles;
close to it
a slightly elevated
oval spot with
very small cells,
~~probably~~ the place
of the original adhesion
of the proles (the place
of the peduncle)



stomata a distinctly
seen (with starch granules
(darkened by iodine)) not far from
the proliferous
opening

in one specimen
6 seen, all on one
side,

7848

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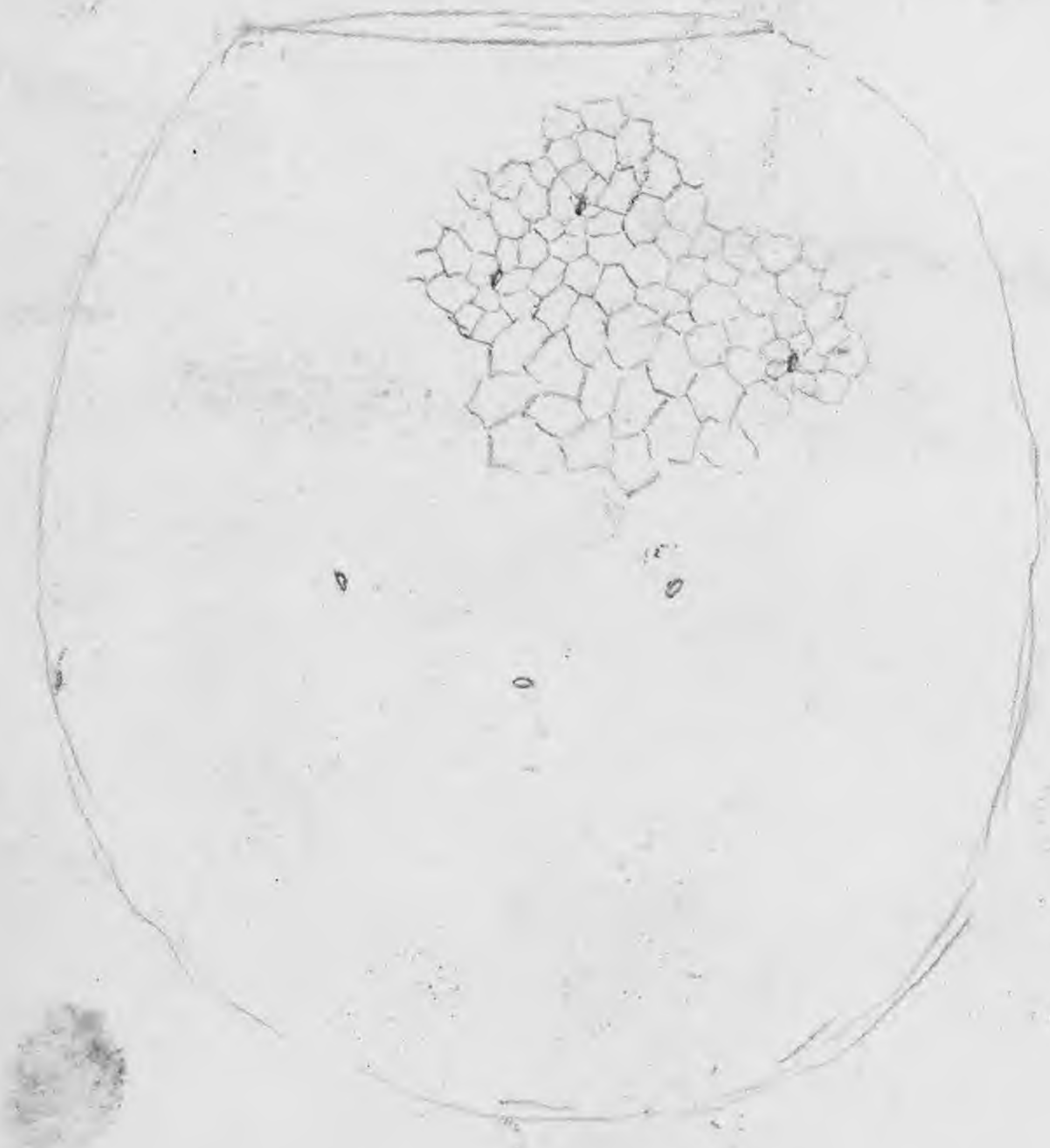
Wolffia ~~arrhiza~~ Columb. July 5 1867

St Louis

x60



position of
the 6 stomata
discovered with
Iodine after
decoloration with
ether – all on
the same side –
none on the other

0 1 2 3 4 5 6 7 8 9 10
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BOTANICAL
GARDEN

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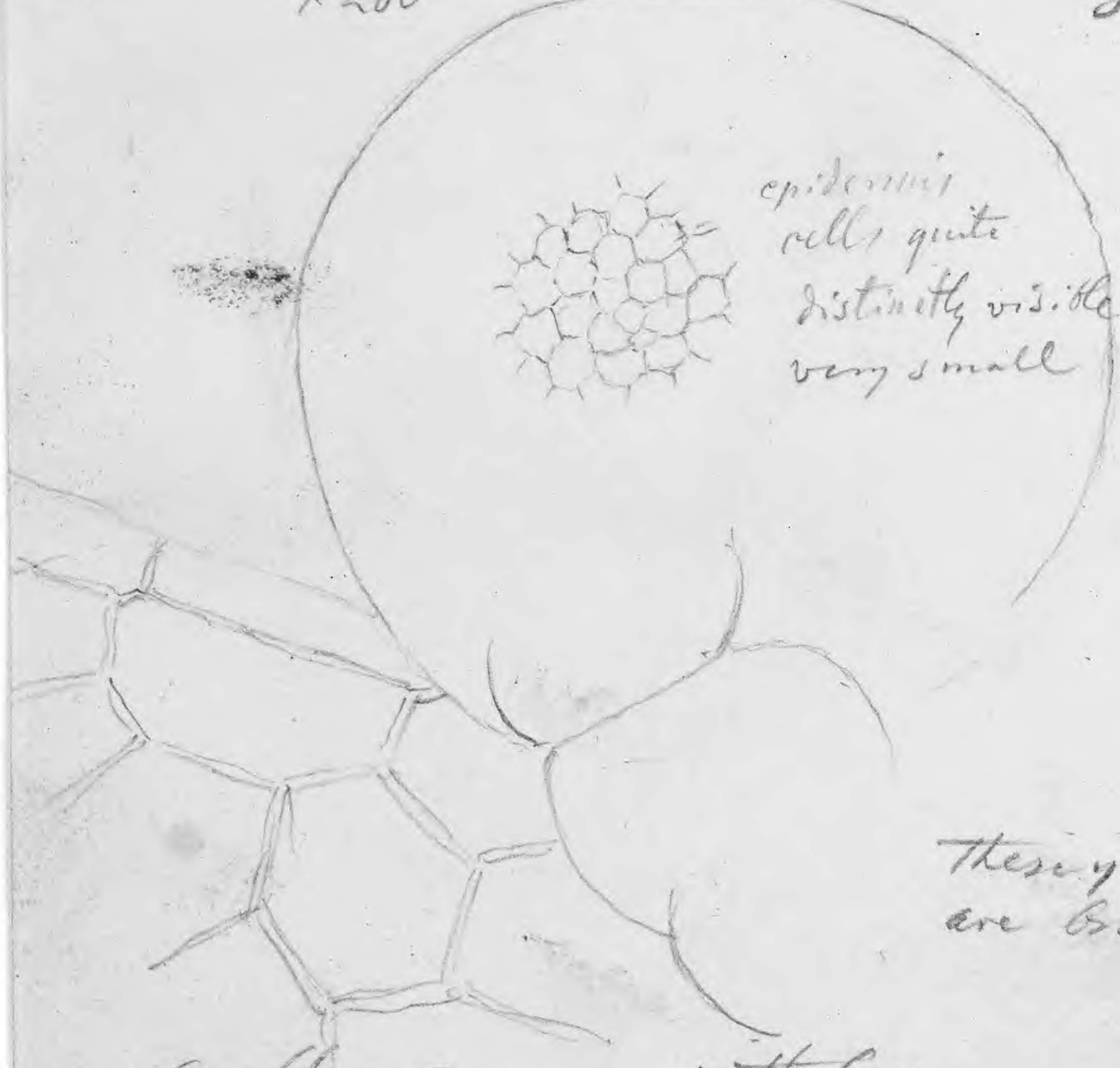
Wolffia ~~arrhiza~~ Columbiana
St Louis

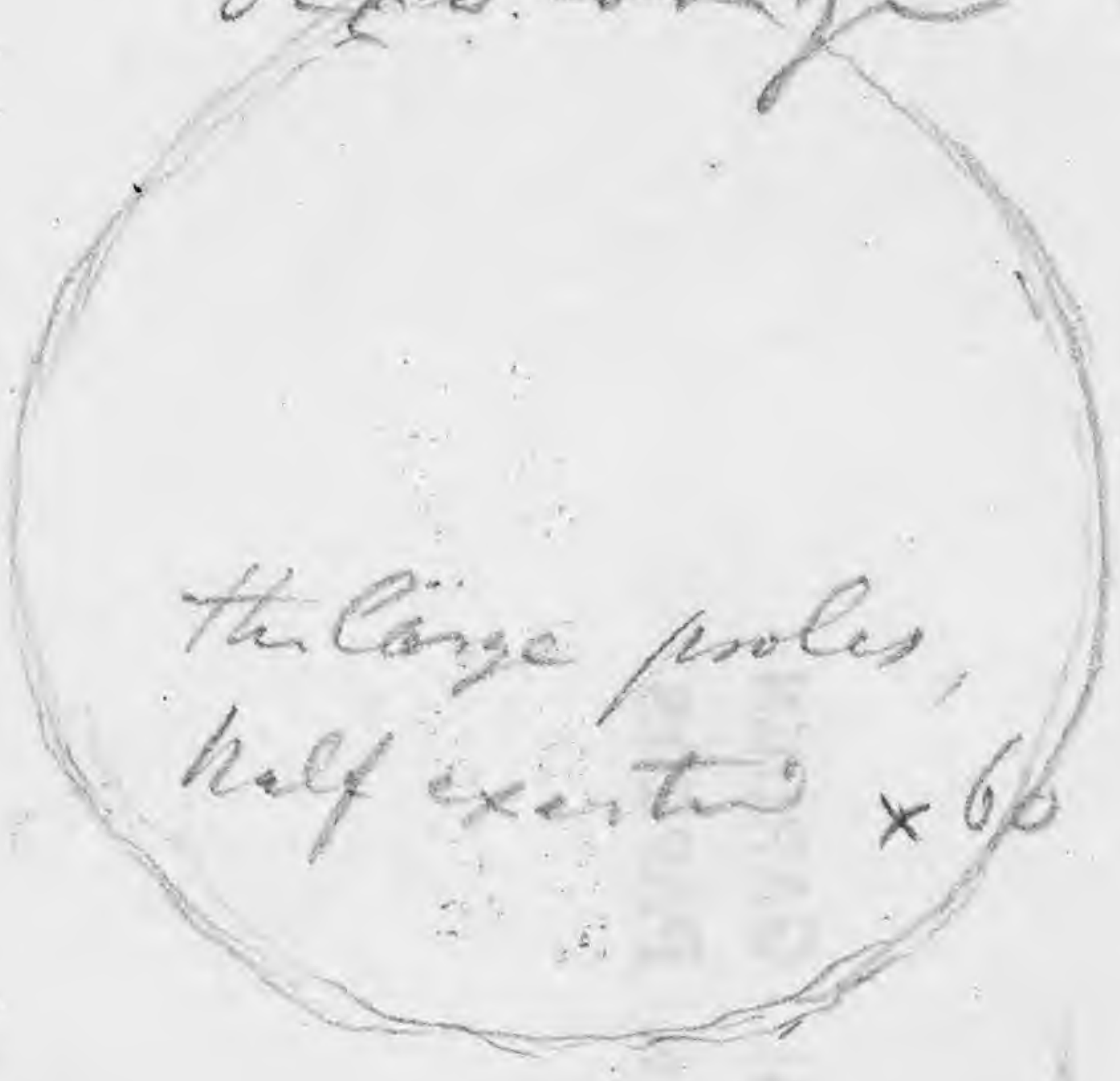
July 5 1867

x 280

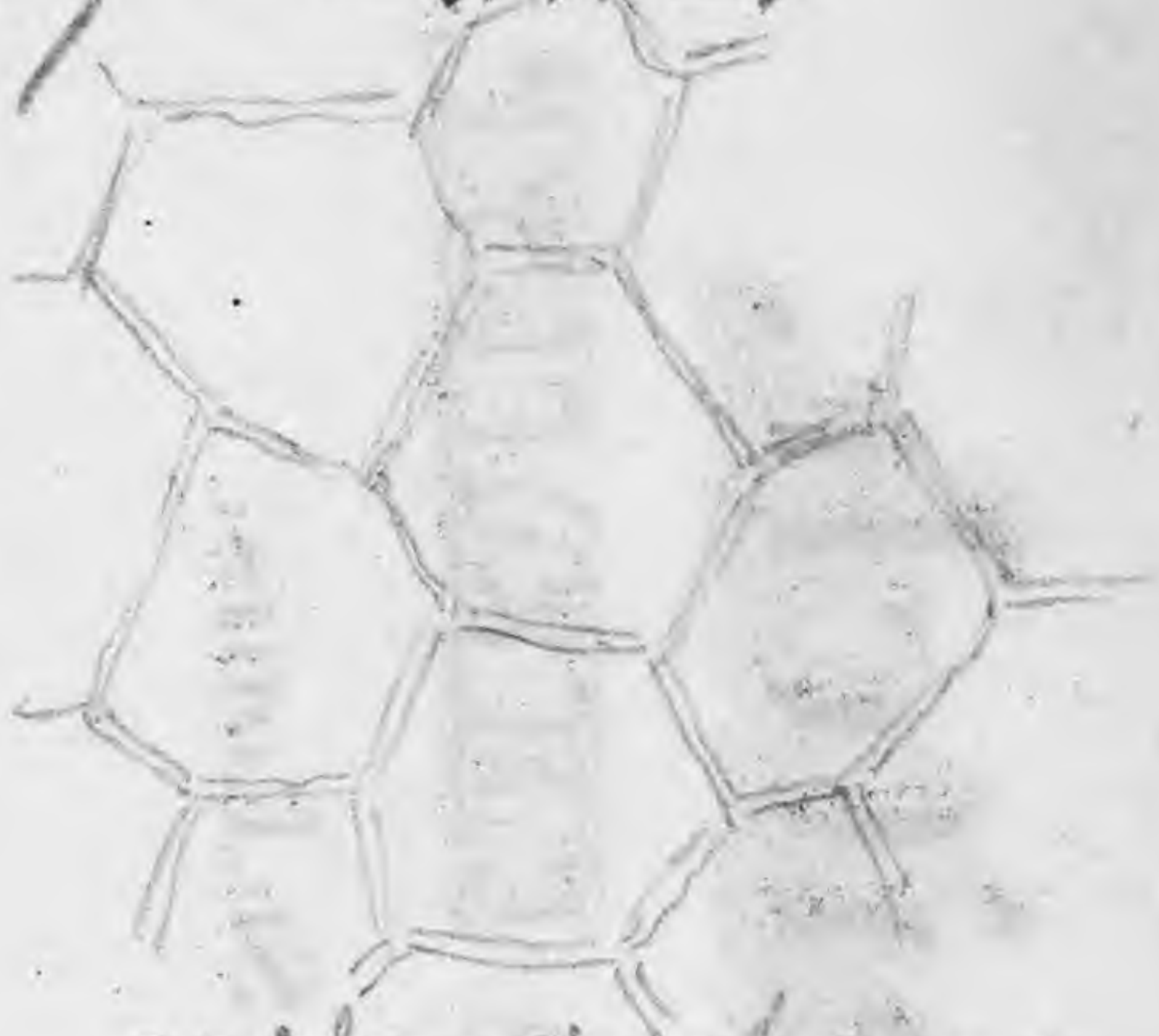


epidermis cells quite distinctly visible very small

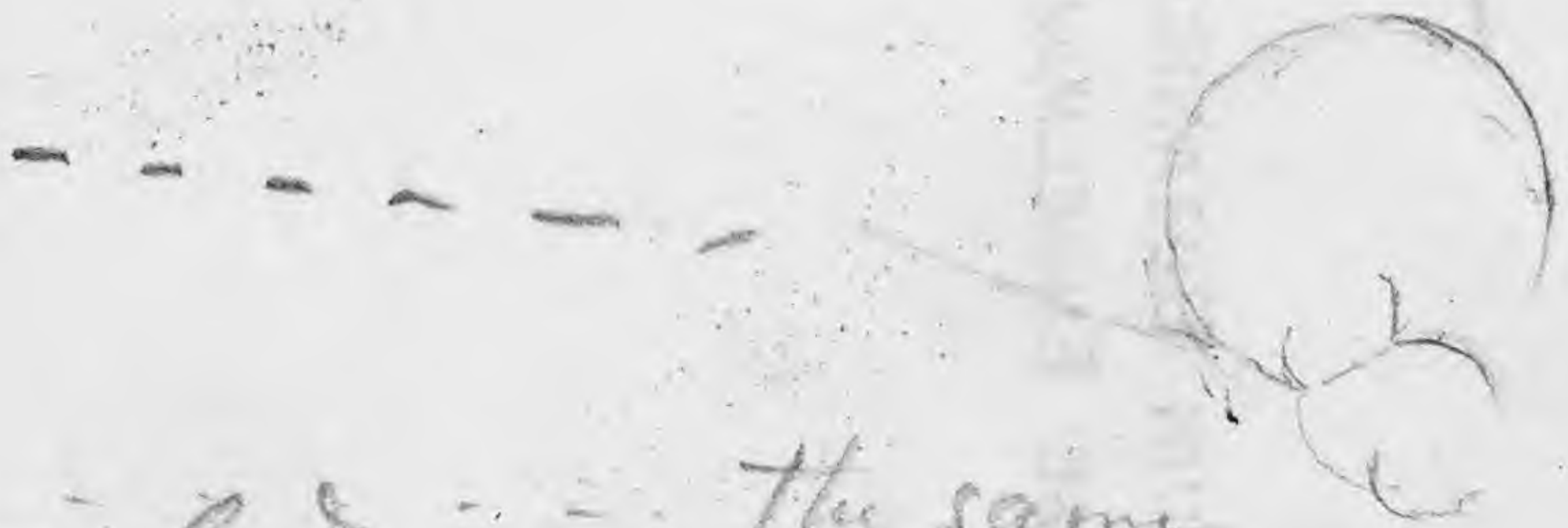
decolorized by ether



the large proles, half exserted x 60



epidermis of same x 280 cells smaller than in parent.



these young buds are browned by iodine -- the same x 60

Smaller germs in the base of the funnel shaped opening somewhat pressed under glass

7850

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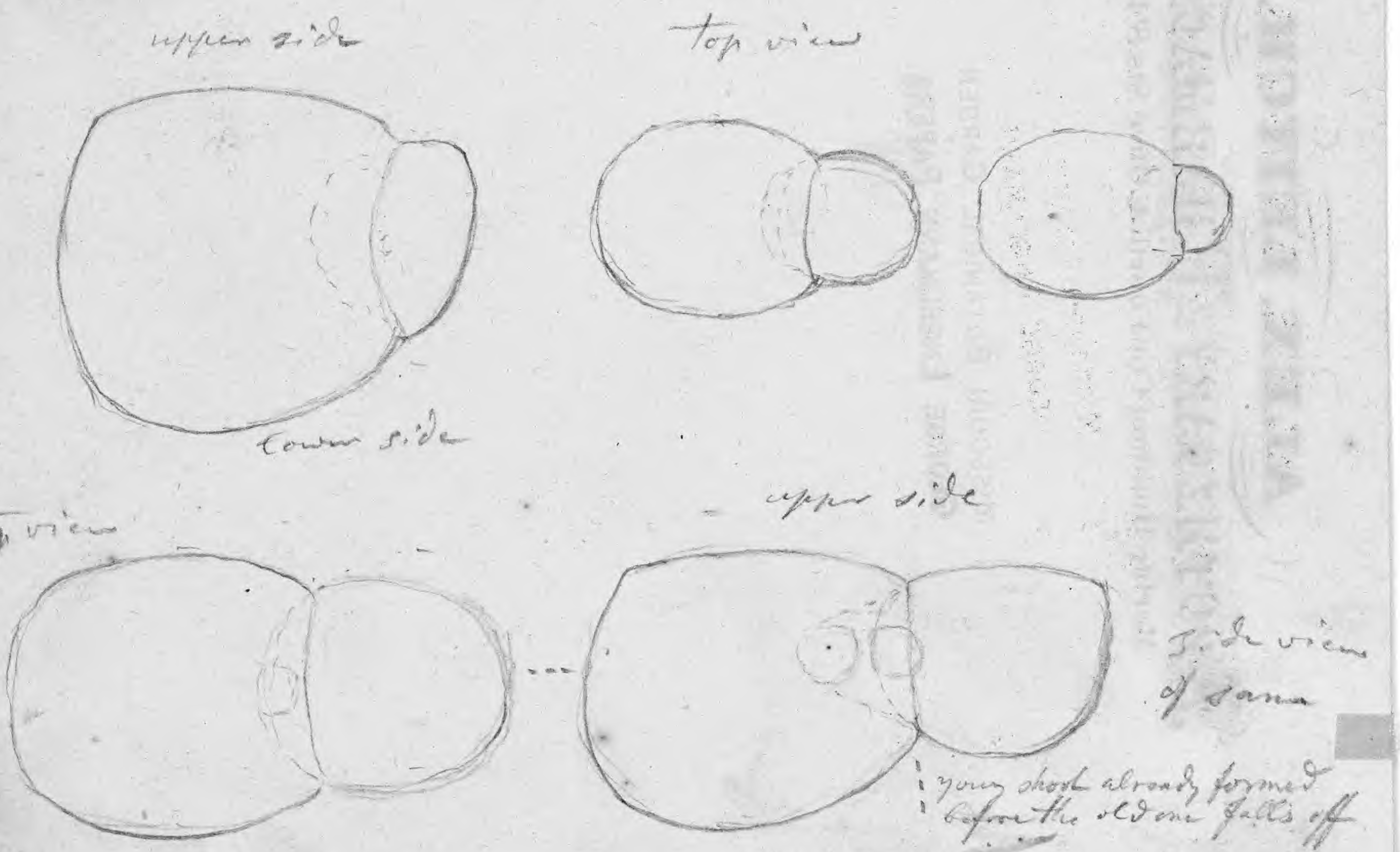
Wolffia ~~arrhiza~~ Columbiana Aug 9 1867

old Quarry near Mound, St Louis

×30

extreme sizes proliferous individuals from 0.6 to 1.0 mm. long


upper side
top view
lower side
top view
upper side
side view of same
young shoot already formed before the old one falls off

7851

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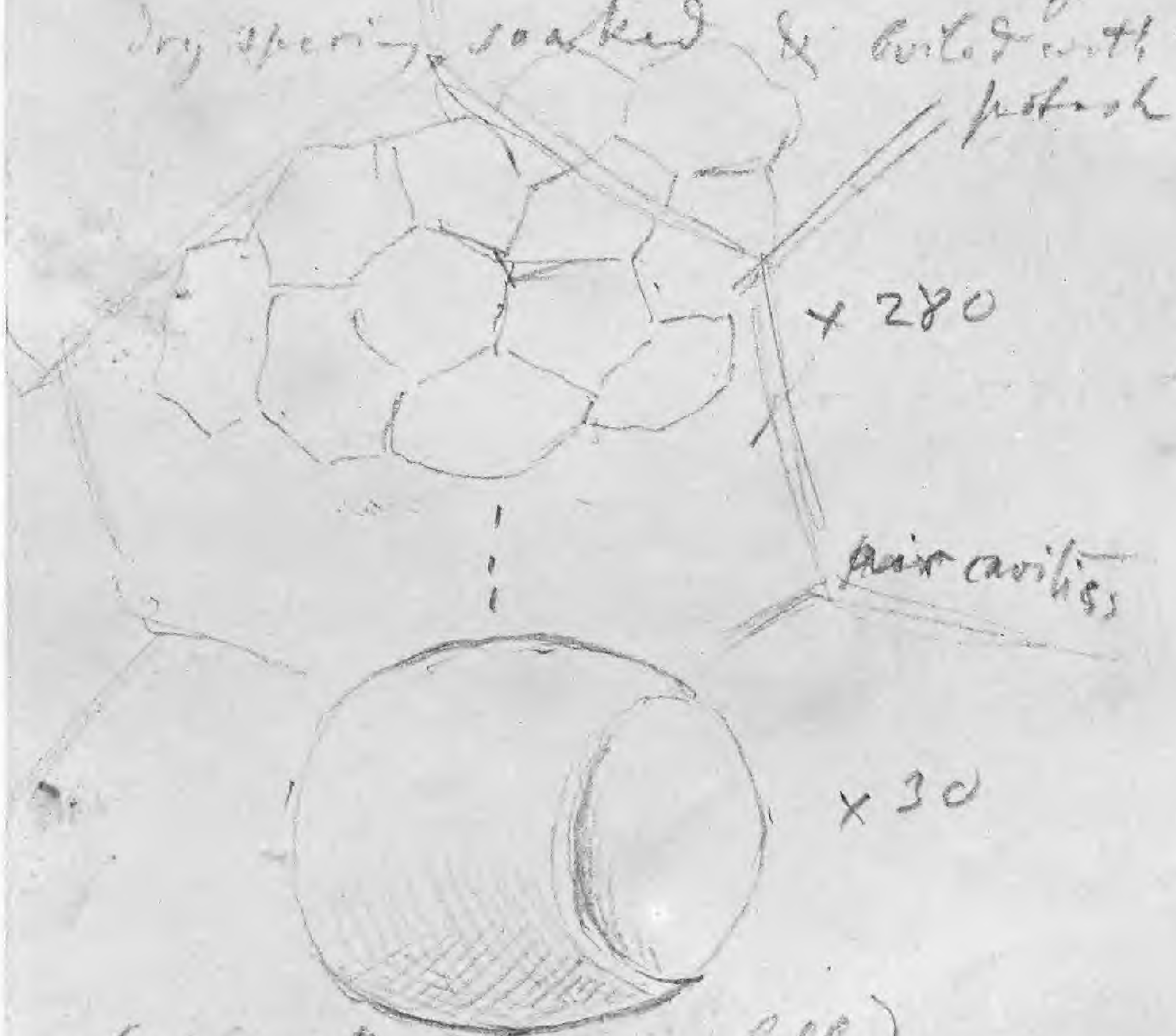
Wolffia ~~arrhiza~~ Columb

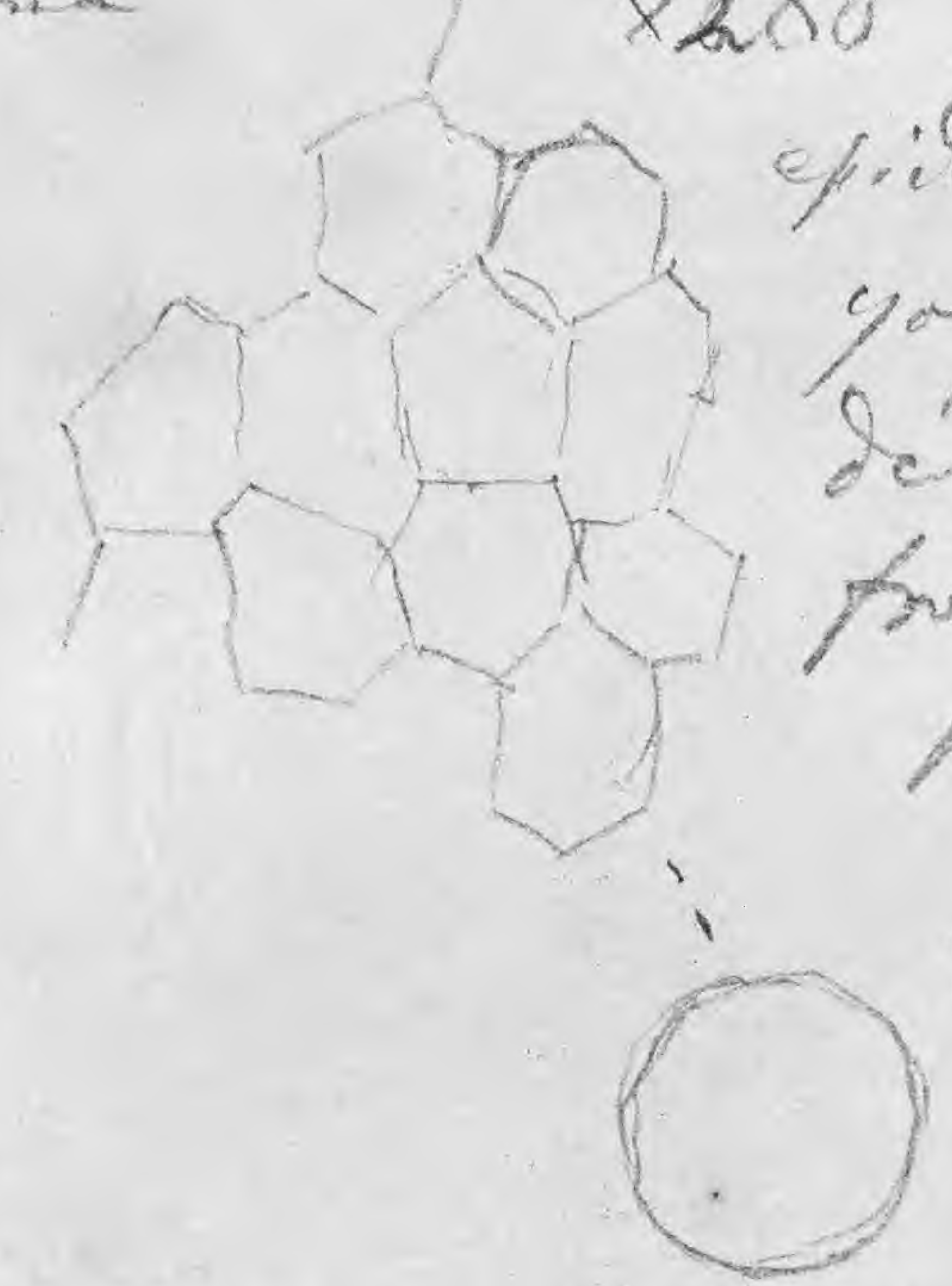
Orange Co N.Y. Aug. 1866 C. F. Austin

Aug 9 1867

dry specimen soaked & boiled with some potash


x 280
hair cavities
x 30

(disc?? or more probably) globe – in view of the circular opening


x280
x30
young shoot

epidermis of young shoot detached from old plant.

disc or globe?

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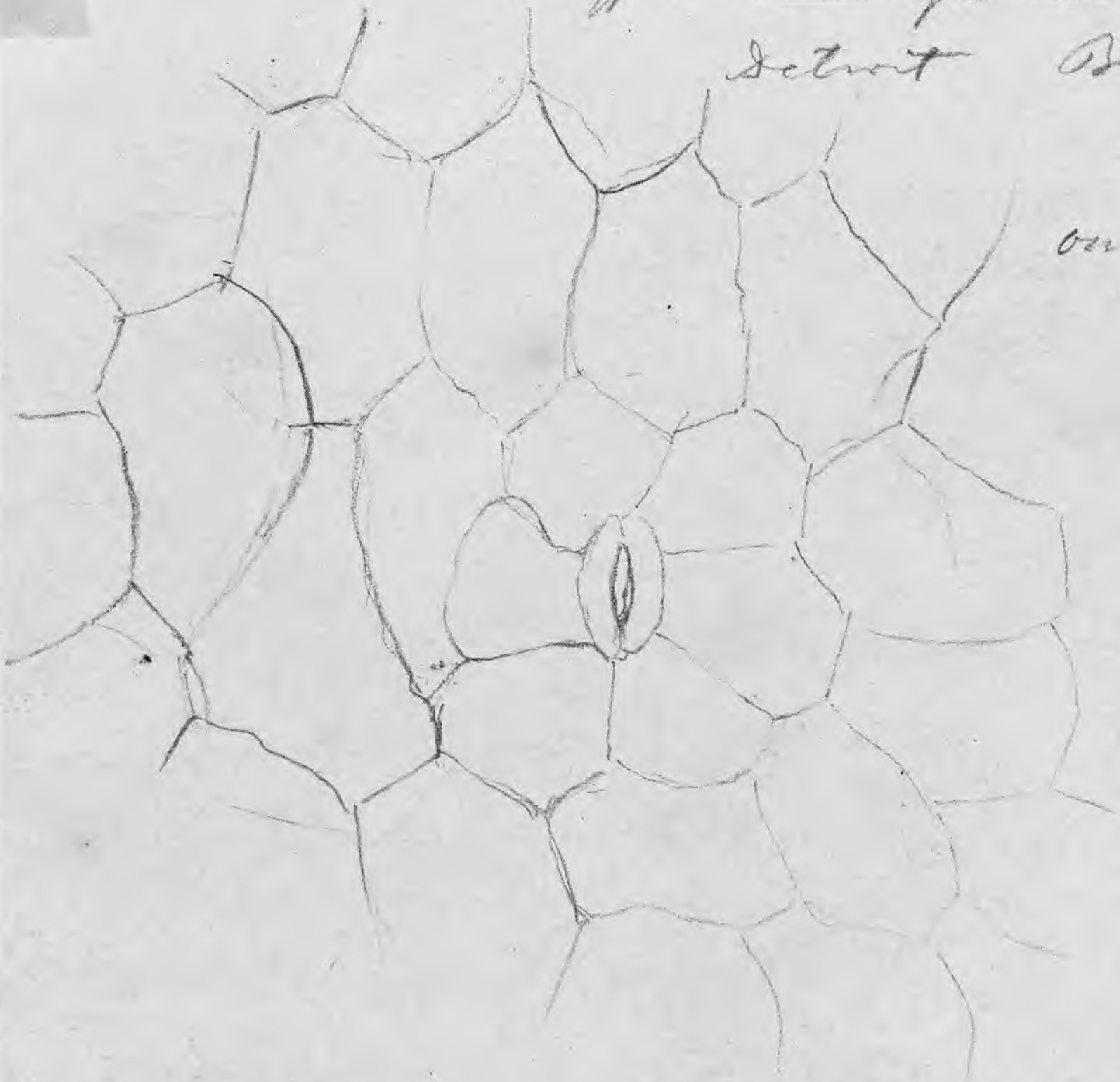
Wolffia ~~arrhiza~~ Columb  Aug 23 1867

Detroit  Bigelow



only 3 stomata seen

small cells of cicatrix where the shoot had been detached from the parent plant is on the lower side, near the opening

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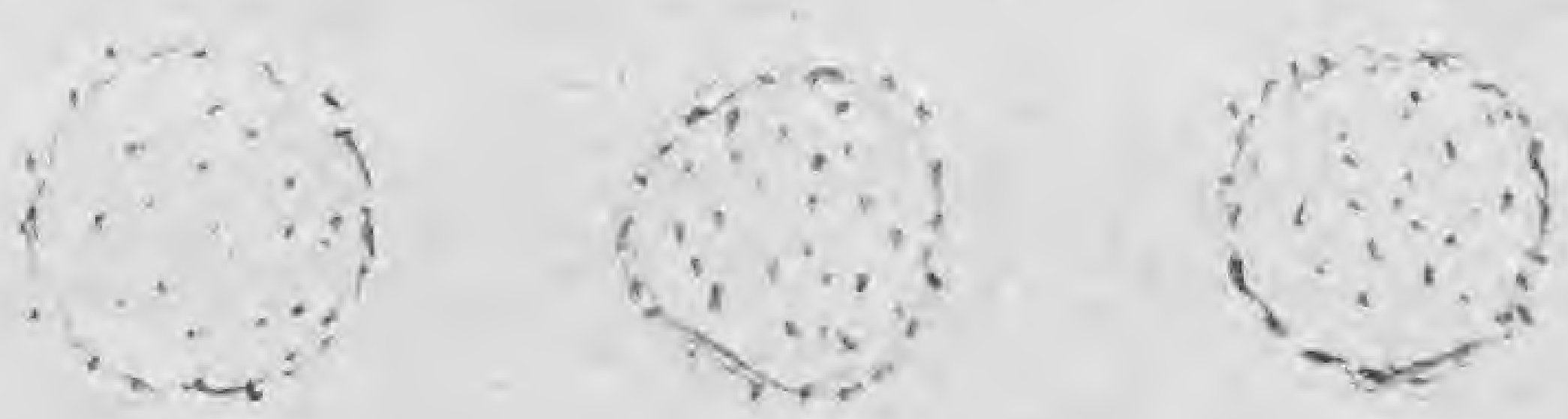
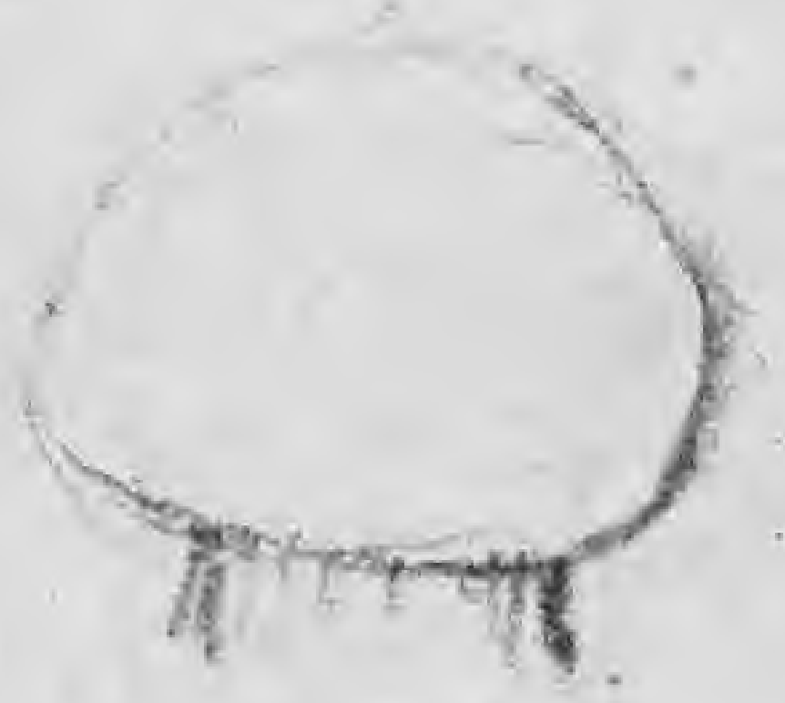
Sept 11 1867

Wolffia Columbiana
Athens Ill. E. Hall Sept 1867



Pollengrains × 415
tuberculous all over 0,017–0,019 mm



anther × 60
seen as a dark body
of fungus like appearance
in 2 specimens! —
No pistil seen. — Pollengrains
very distinct.
Anther probably very young
and pistil not yet developed

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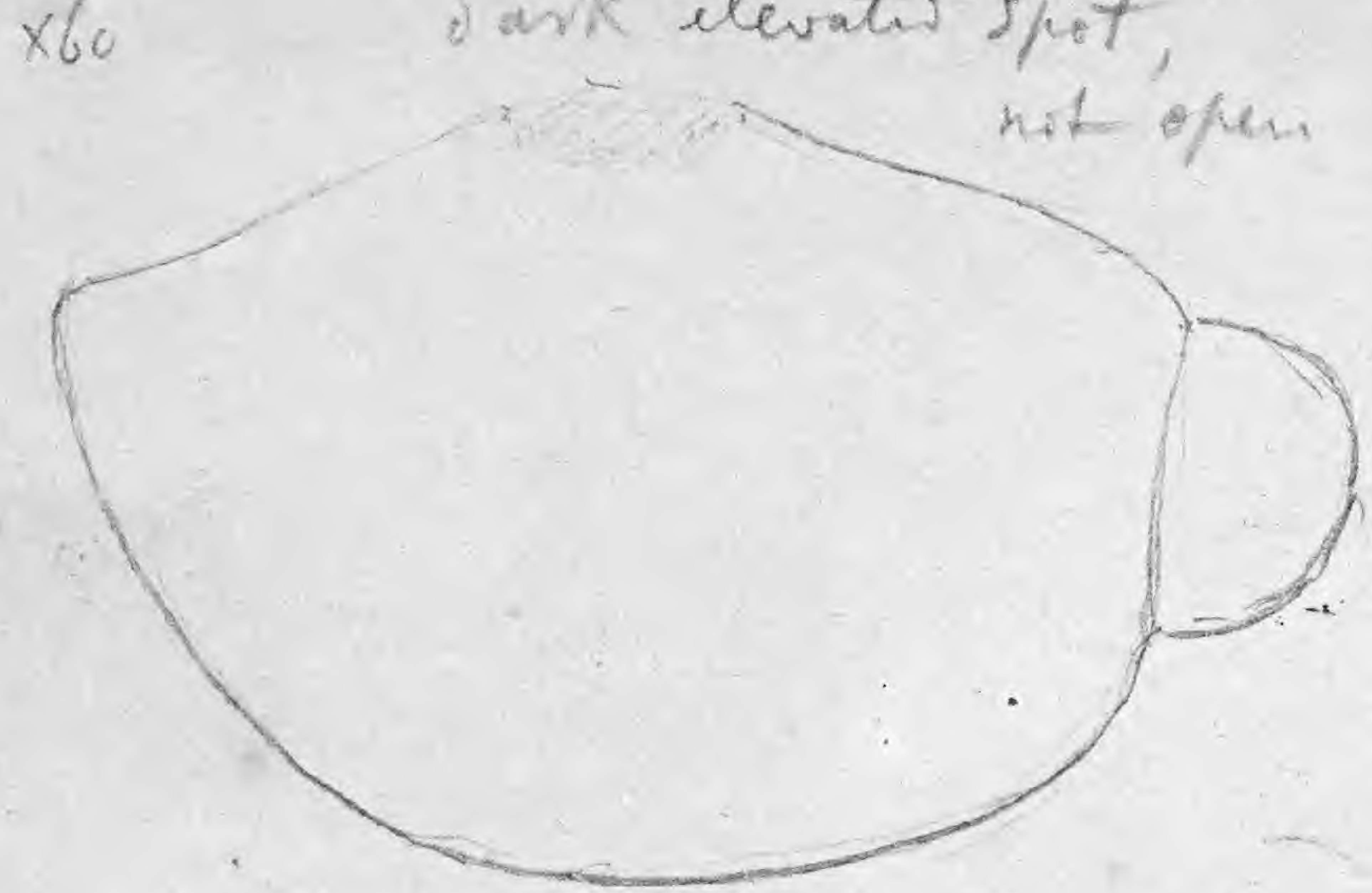
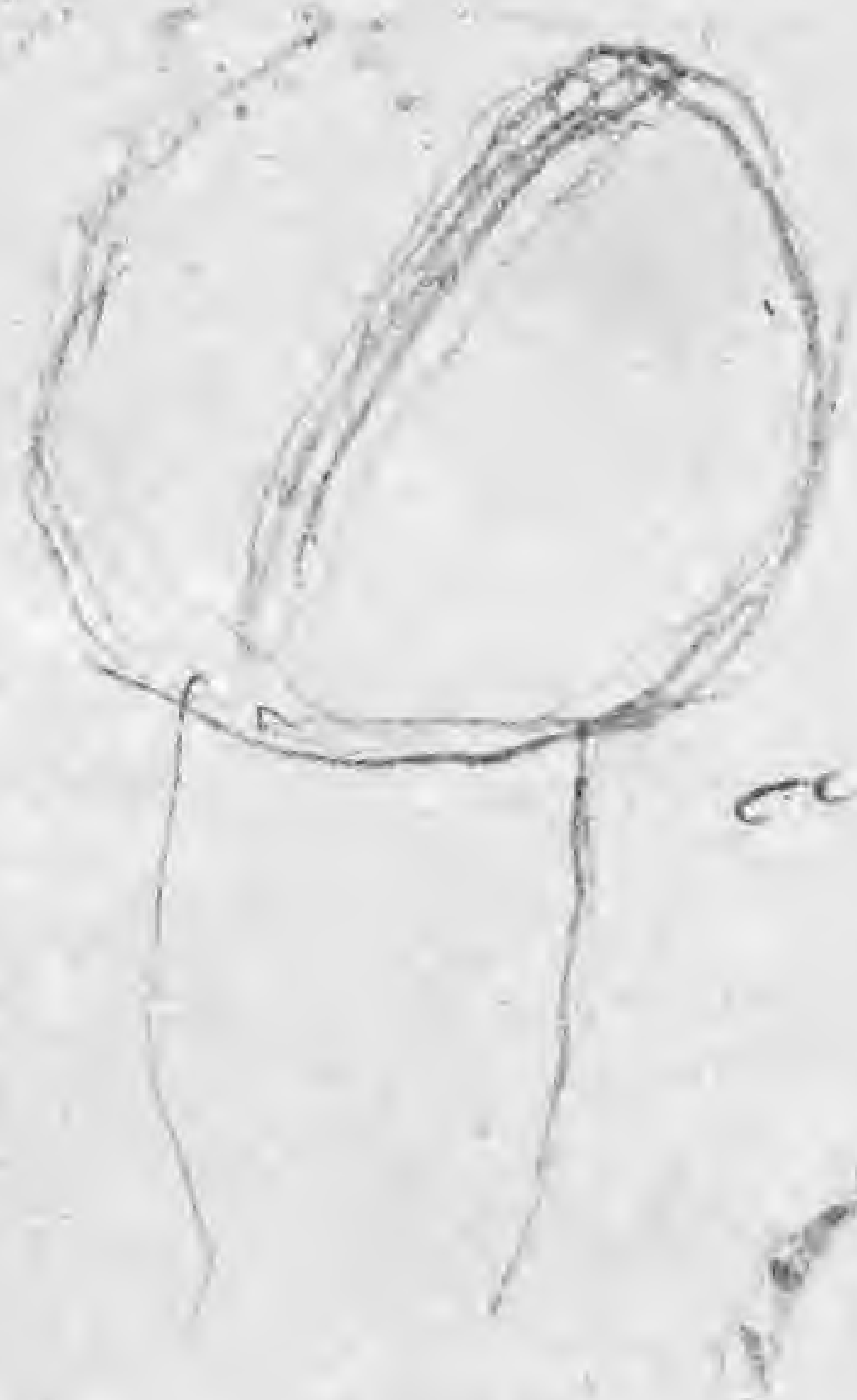
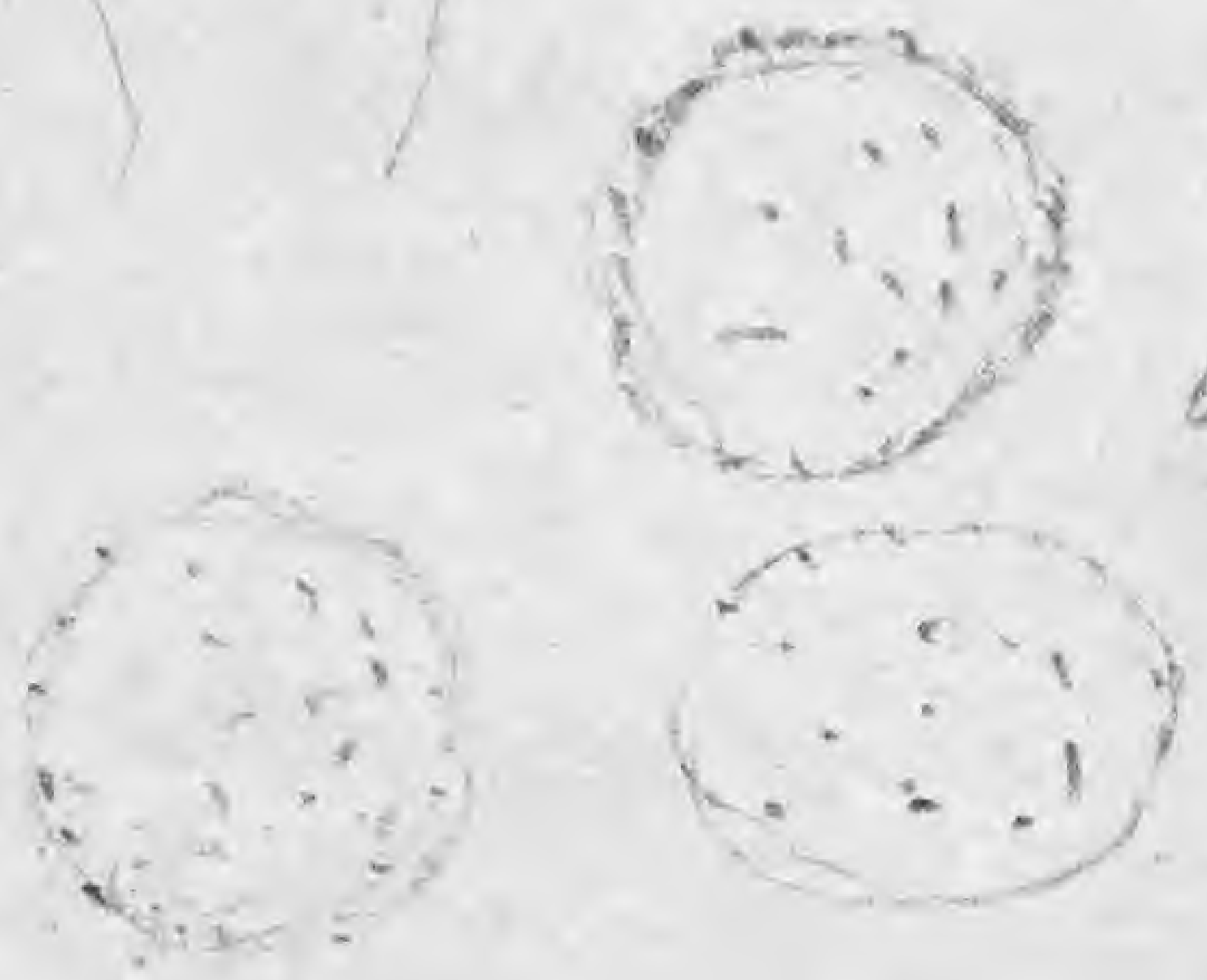
Wolffia Columbiana Sept 18 1867

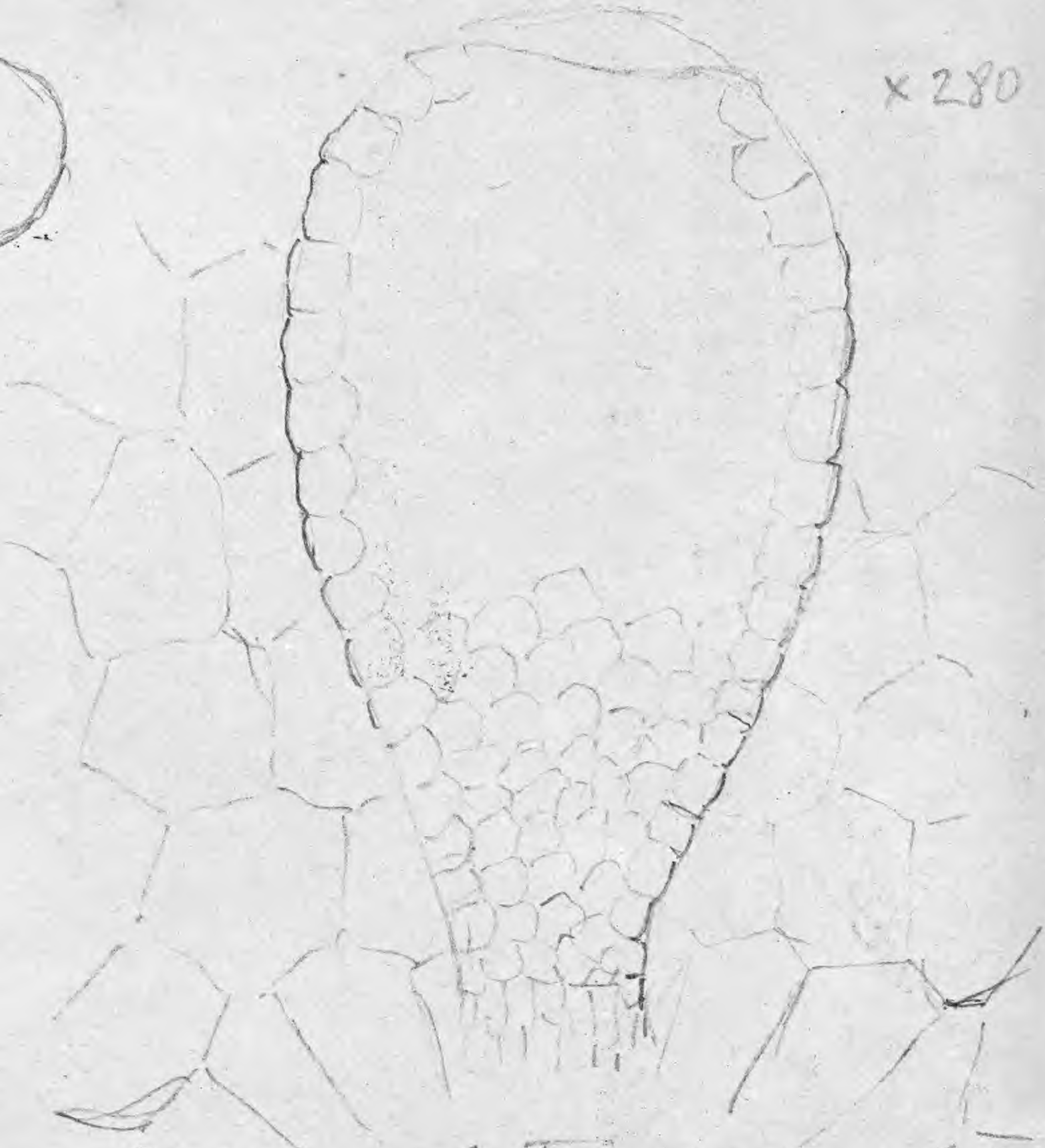
Athens Ill, E Hall


x60
dark elevated spot, not open


x60
anther from the above specimen


x415
Pollen grains of same

anther and ovary abortive filling cavity



abortive ovary

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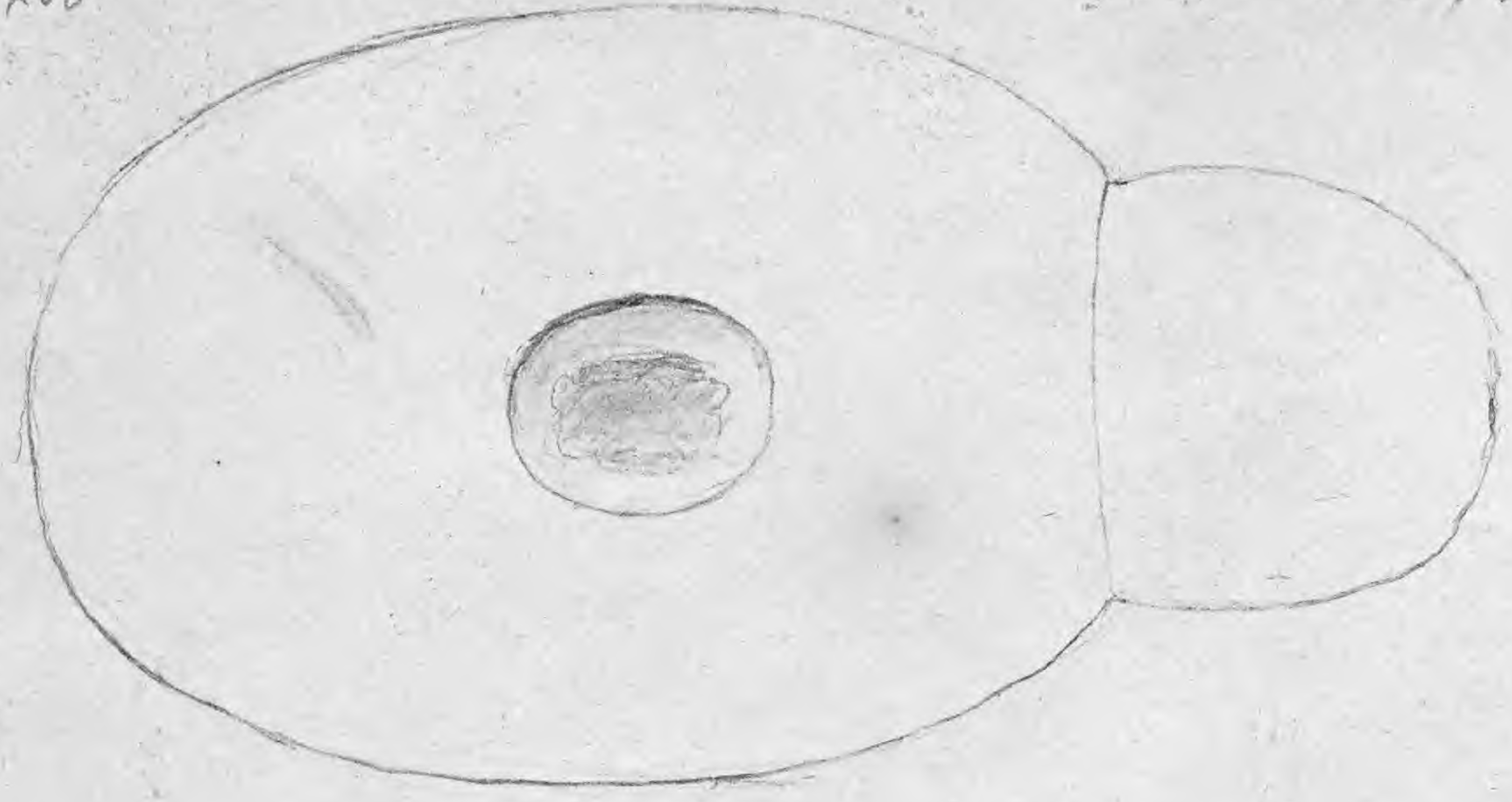
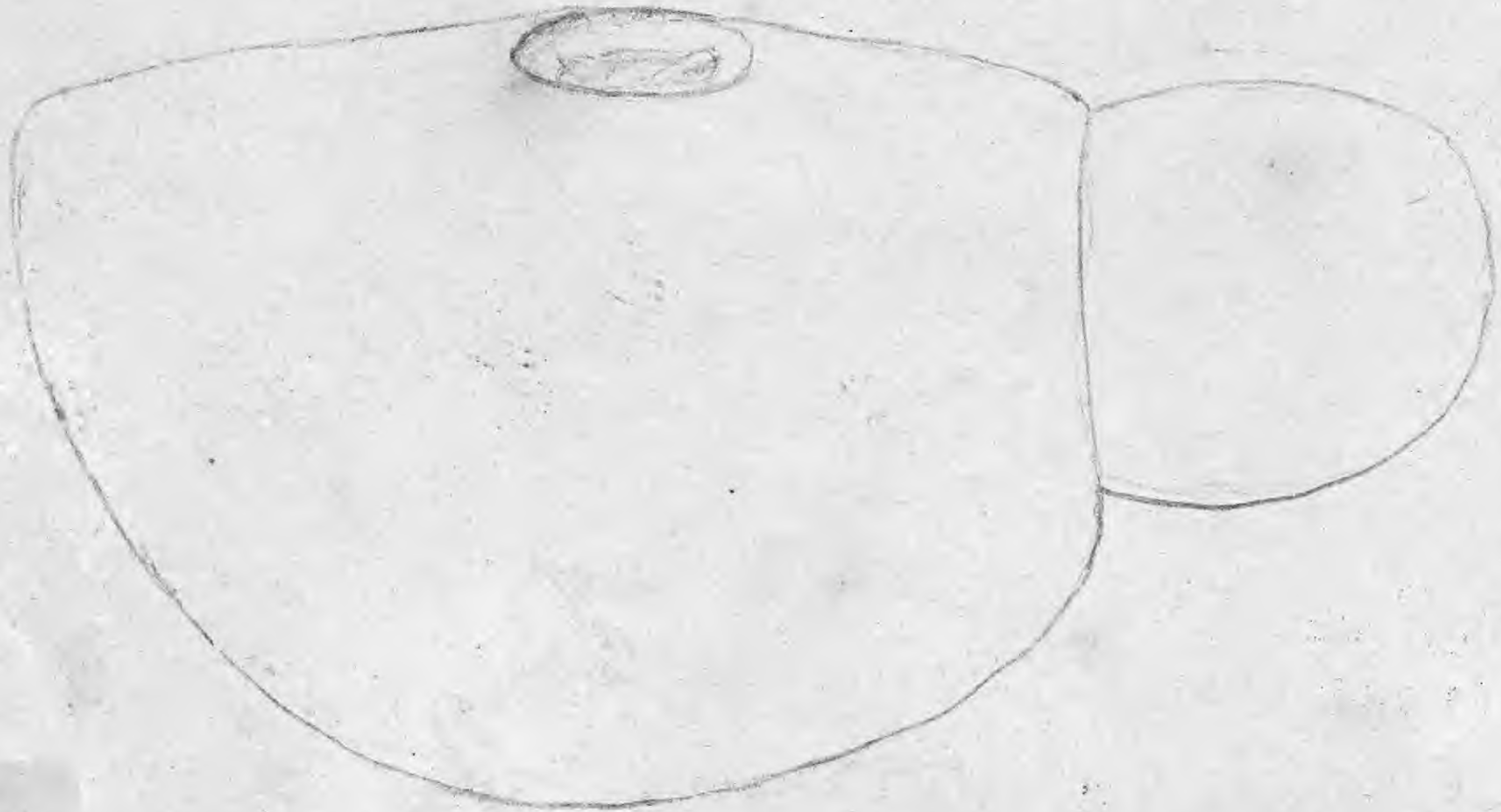
x60

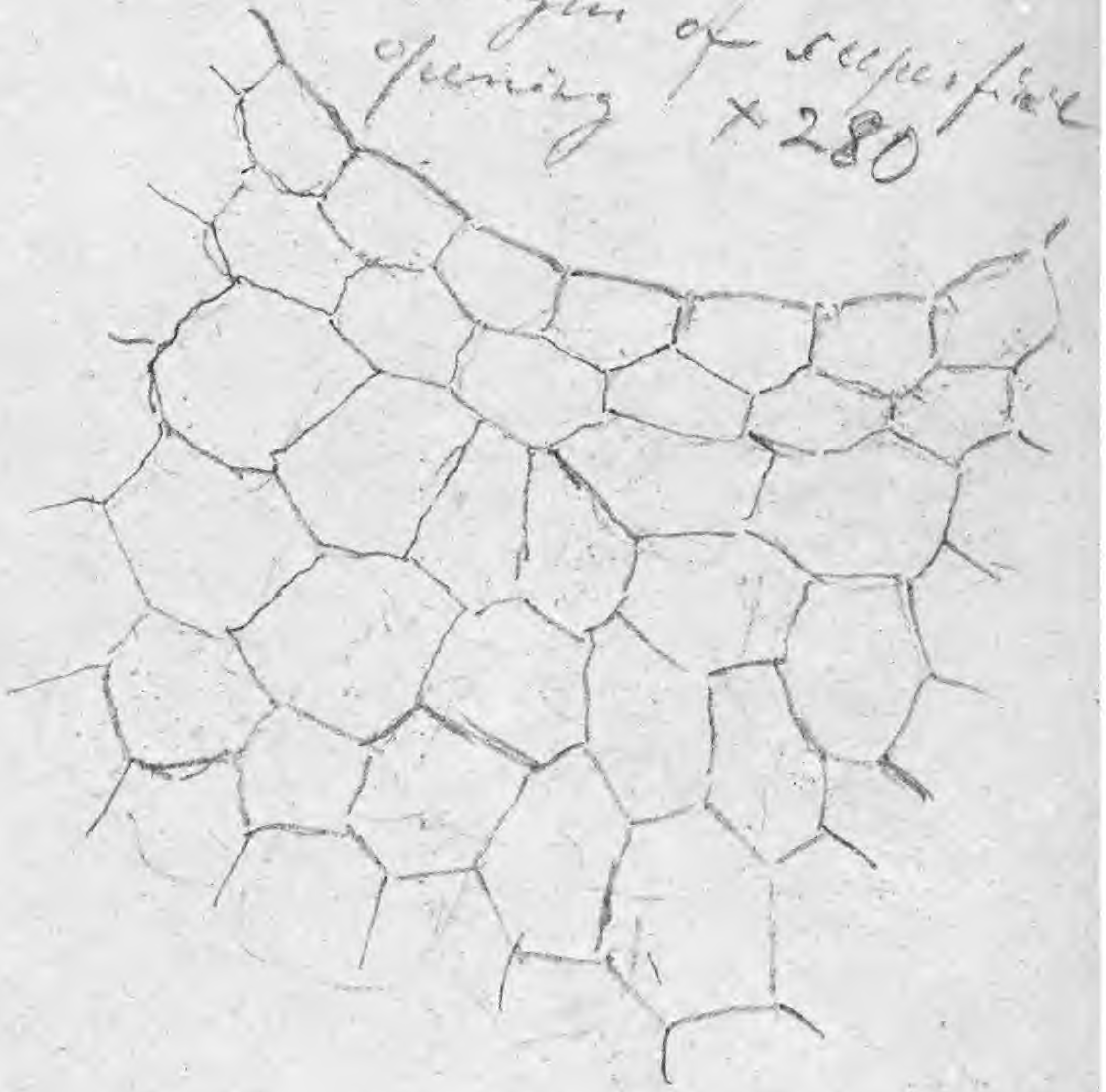
Wolffia Columbiana
Athens, Ill.
E. Hall

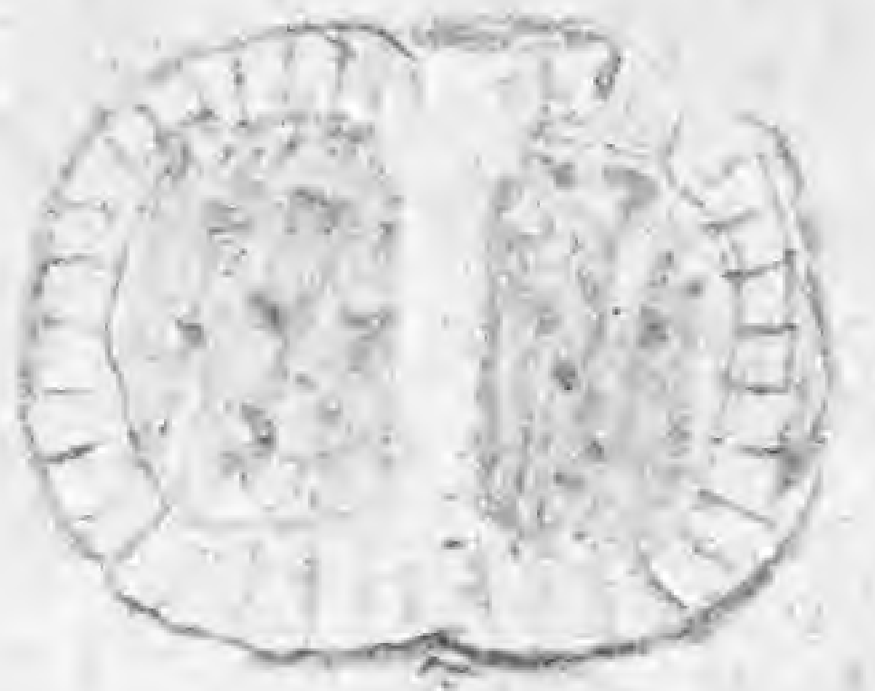
Sept 18 1867





margin of superficial opening x280





anther x60 from Tipvica

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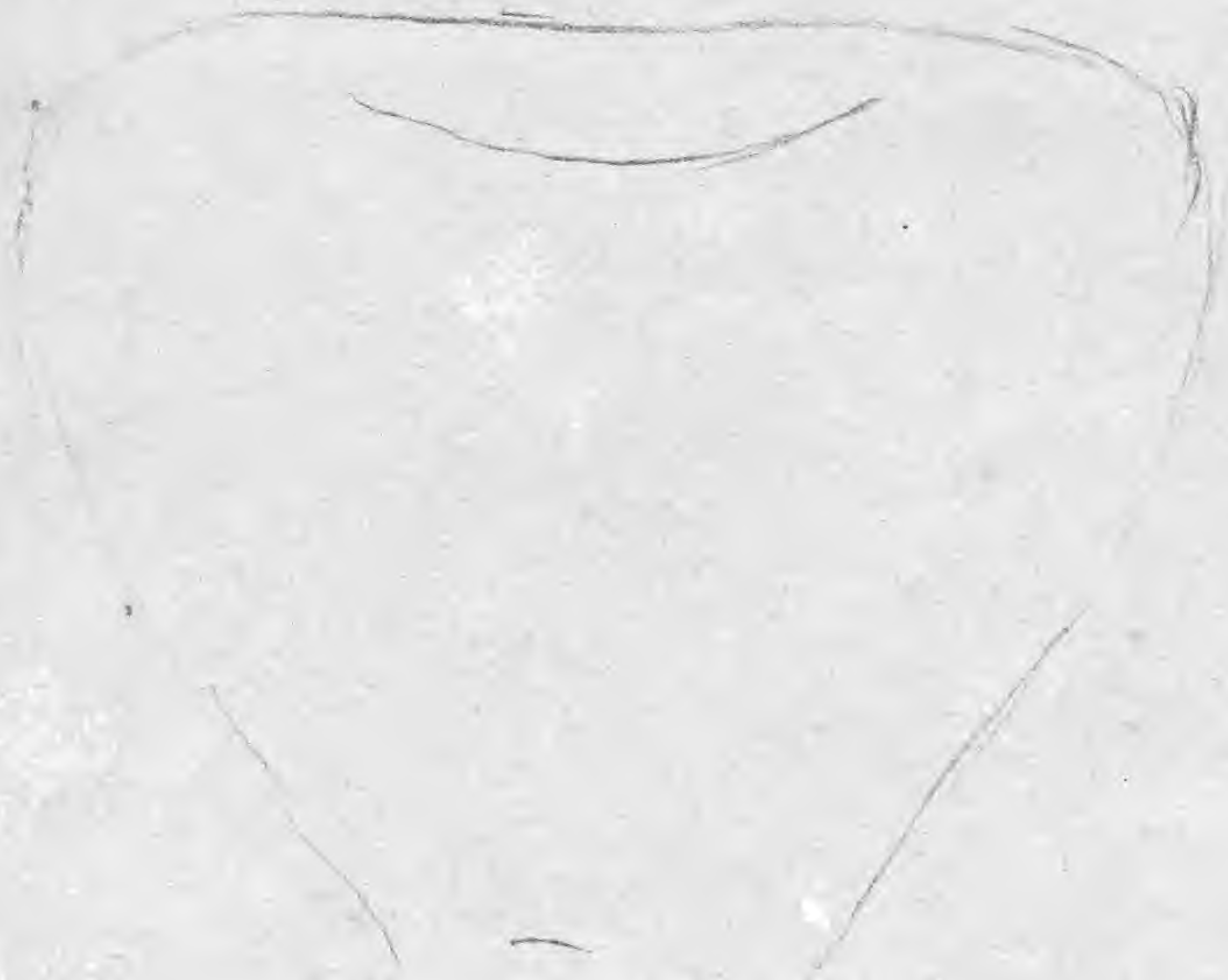
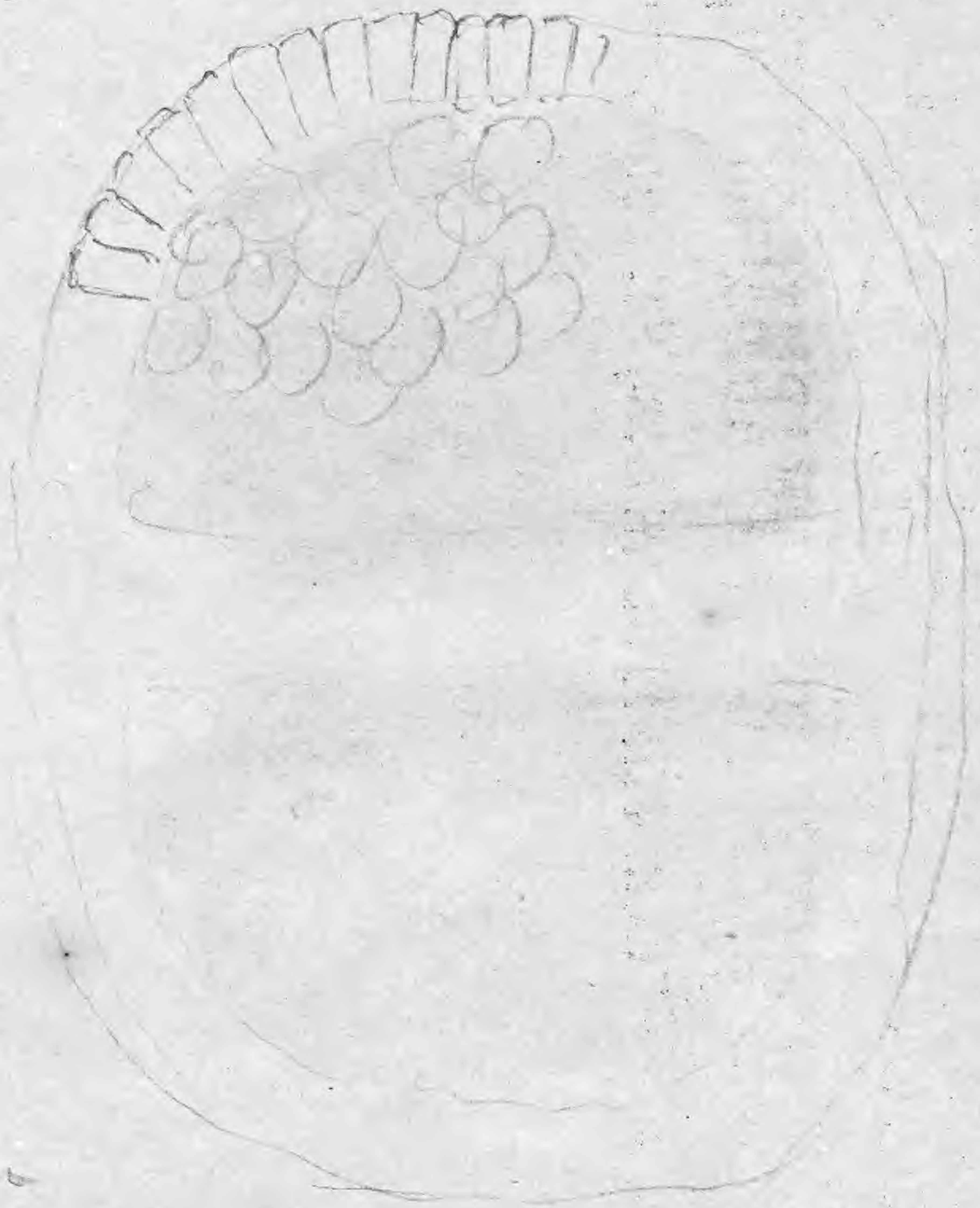
Wolffia Columbiana Sept 21 1867

Athens Ill E Hall

× 280



incomplete ovary



incomplete anther

Among perhaps a thousand specimens examined, half a dozen were found which had a genital opening, and rudimentary pistil (without ovule) and anther (the latter with pollen) which remained in every instance undeveloped

7857

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Ex Herb. G. Engelmann

Wolffia Columbiana, Karst.

subimmersa, major, sphaeroidea, grandicellulosa, concolor, stomatibus paucissimis; sicca tenuissima margine obscuriore cincta; et

Wolffia Brasiliensis, Wedd.
var. borealis

natans, minor, oblonga, antice subacuta, parvicellulosa, densior, supra laete viridis, subtus pallida, plus minus brunneo-maculata, stomatibus plurimis; sicca tenuis, concolor (si verticaliter compressa) vel margine superiore recto obscuriore (si a latere compressa).

In lacu quodam inter Springfield et Athens in Illinois centrali, abunde cum Lemnis, Ceratophyllo, Anacharide, etc.

Leg. Elihu Hall, Sept. 1867.

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7858

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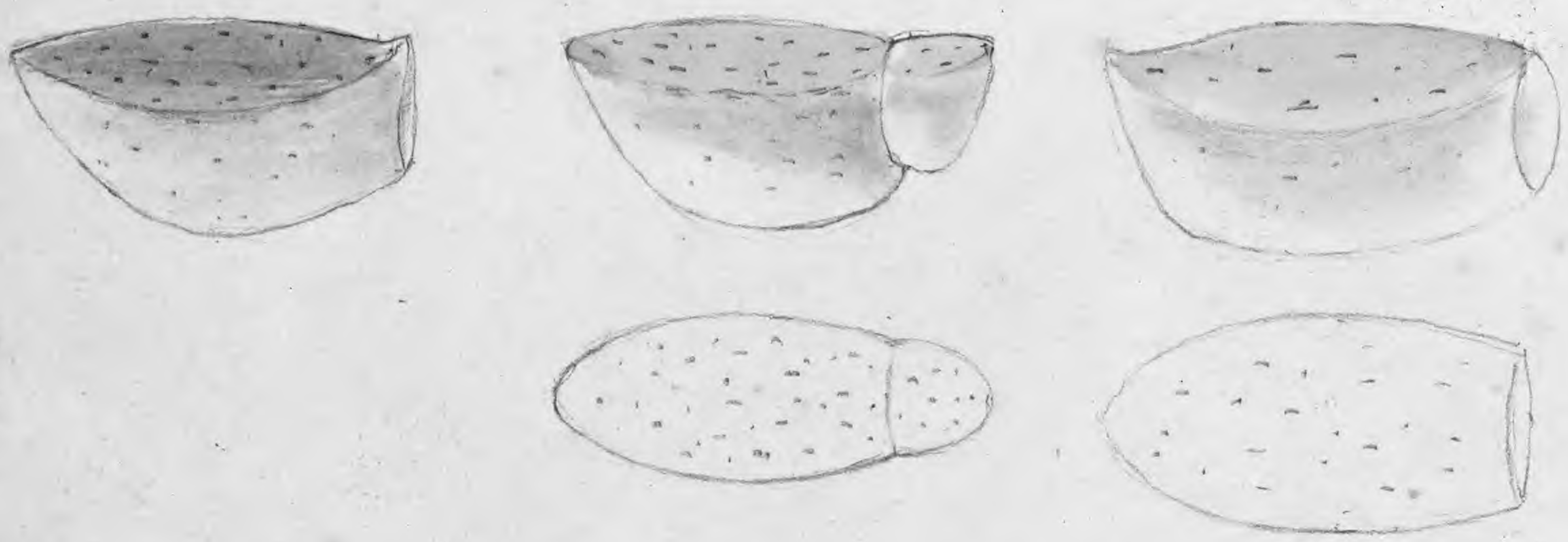
Wolffia Aug 12 1867

~~Austin misit~~ ? Payne, Ontario

soaked and boiled in dilute Potash solution

× 30


side view

top view

Epidermis & Stomata same as in the flat colourless form figured yesterday.

$\frac{23 - 30}{30} = 0.8 - 1.0$

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Wolffia in Herb. Gray    Sept 10 1867

Salisbury Ct. Robbins 1829    W. Columbiana
(2 specimens of W. Brasiliensis mixed with it, but probably by mistake by me)

Canaan Station Robbins    W. Columbiana pure
Orange Co N.Y. Austin    W. Columbiana pure
Lake Ontario Paine    W. Columbiana
with some W. Brasiliensis.

---

Athens Illinois E Hall    W. Columb & Brazil
always more Columbiana, when mixed
Detroit Bigelow    W. Col & Brazil
St Louis ! Pr. Rouge & Parkhouse Marsh    W. Columb pure
N Orleans R Hall in Hb. Durand & Torr    W. Columbiana pure

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for Gray Jan 1868 nearly 2/3"

Wolffia Brasiliensis, Weddell: frond oblong, 1/4 - 1/2" long

more densely cellular

√ flattish ~~and~~ deep green above, with numerous stomata, ~~thickened,~~
~~and spongy~~ ~~or hemispherical~~ tumid ~~below~~ pale below, ~~with the~~
anterior edge sharp, the nearly circular proliferous opening at
the base ~~with a thin border~~ as in the other species; the whole
surface (~~with~~ brown dots more or less marked); when dry
all green or green only on a straight edge. — Floating on
the surface of stagnant waters, always, thus far, with the
other species on da Ontario Lagoons, near Detroit, Bigelow and
in Illinois (Hall) — the specimens of the latter often ~~almost~~
dotless when young. The fruiting plant, a little smaller
and more strongly dotted than ours, was discovered by Weddell
in Brazil; The ~~Lemna~~ L. arrhiza of the old world
is (a little larger very similar but) with larger
stomata and without dots.

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Tabel No 4

5, ~~After~~ The remarks made above and in the last number make it almost unnecessary to say any thing more ~~another word~~ about the meteorological condition of the autumn, I have not noted a warmer autumn in the last 32 years with the exception of those of 1854 and 1865, nor a drier one, except those of 1844 and 1845, nor a clearer and fairer one, unless it was that of 1851.

7861

Sept 9 1867

Annales des Sciences Naturelles
III^e série, Botanique tom 12 Paris 1849

pag. 155 Observations sur une espèce nouvelle de Wolffia - pl. VIII.

p. 159 young plants, buds just detached have cells full of amylum, which by and by diminishes and disappears.
Young buds, still enclosed, show already rudiments of buds themselves; while the Lemnae produce their buds bifariously the Wolffiae do it in a zigzag line [approaching a straight axis]

p. 160 W. Brasiliensis ~~has~~ similar to arrhiza, but is distinguished by nodules of brown colour slightly prominent; evidently a deposit of some kind in some of the epidermis cells.
epidermis cells angular, with straight lines, ~~not~~ as in W. arrhiza, not sinuous as in all Lemnae
Stomata only on the upper surface, much like arrhiza
Fruiting specimens show the development of the flower already in the youngest conditions; those that do not exhibit it then do not develope it at all.
stamen behind*) the pistil and a little lower — no floral envelopes. *) Weddell calls it regularly anterior; ~~le~~ pistil se trouve appliqué sur la face postérieure de l'étamine. — Then, of course, the polliferous opening is posterior and that is more correct than ~~my~~ nomenclature //

p. 161 The anther has only one cell with a transverse dehiscence; but that cell is, before opening divided by a kind of false dissepiment [in the same direction as the line of dehiscence] which soon disappears leaving a trace between the valves
Stigma & anther scarcely exceeding surface of plant.
162 Ovule erect basilar, or rather a little oblique
On line of dehiscence of anthers as well as on stigma & style same brown cells as on epiderm

pag 163 The ripe fruit is nearly globular and fills the whole plant almost

p. 164 fruit an utricle which does not open, but may rot away testa thick [seed smooth with two darker spots, the micropyle above and the Chalaza below] coloured violet by Iodine

The Secundine (tegument interne) is very distinct in the unripe seed, cylindric, and terminates upwards with a dark coloured thick part, which forms the dark spot at the Chalaza, [and the

p. 165 In this secundine is a cavity the walls of which are beginning to be coated by the forming perisperm and from the top of which ~~the~~ Embryo is suspended (the suspensor fleshy) Soon the cavity is filled by perisperm and Embryo and the secundine becomes an inconspicuous membrane, only the upper and lowest part remain thick, dark and conspicuous, the former is the ~~operculum~~ (coiffe)

p. 166 The persistence of the suspensor, which becomes a real ligament is peculiar to all Lemnaceae in which the "coiffe" or embryotega exists [not in all ??]

On the top of the embryo proper, not far from where the suspensor is inserted, is the „fente gemmulaire"

p. 169. 170 Wolffia Hork. Schleid Linn 13. 389
W. Michelii Schleid. Mon. Lemn. Beitraege zur Botanik
Leipz 1844 I p...
W. Delilei Schleid. Lin 13
W. Brasiliensis Wedd.

Hoffmann, Anatomy of the frond of Lemna arrhiza in Tydschrift ~~voor~~ natuurlyke Geschiedenis etc with plates.

fig 2

$\frac{1}{40}$

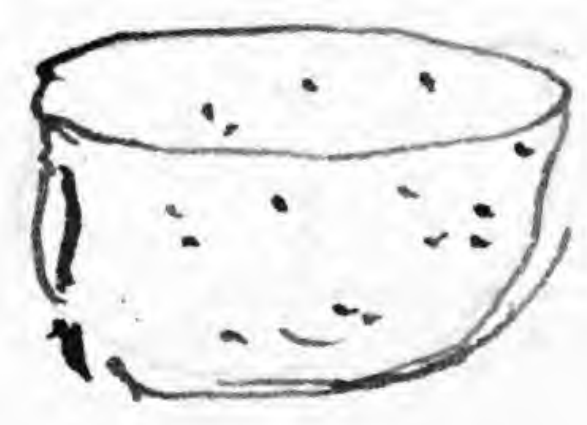


fig 8

$\frac{1}{50}$

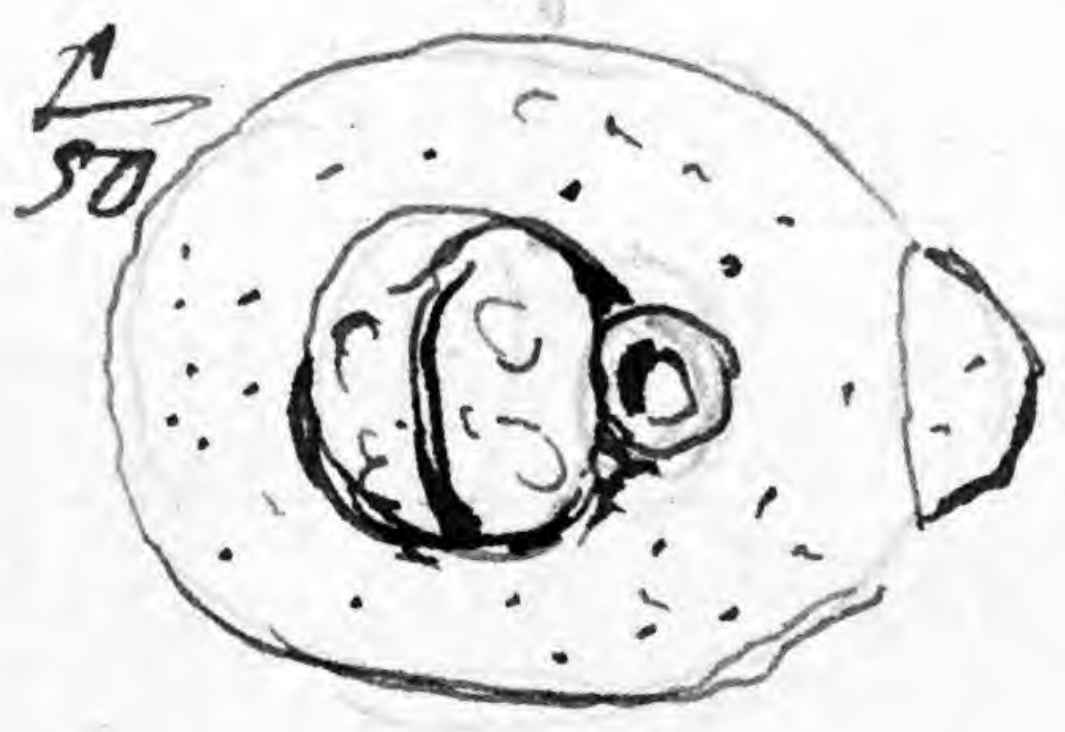


fig 9 $\frac{1}{60}$

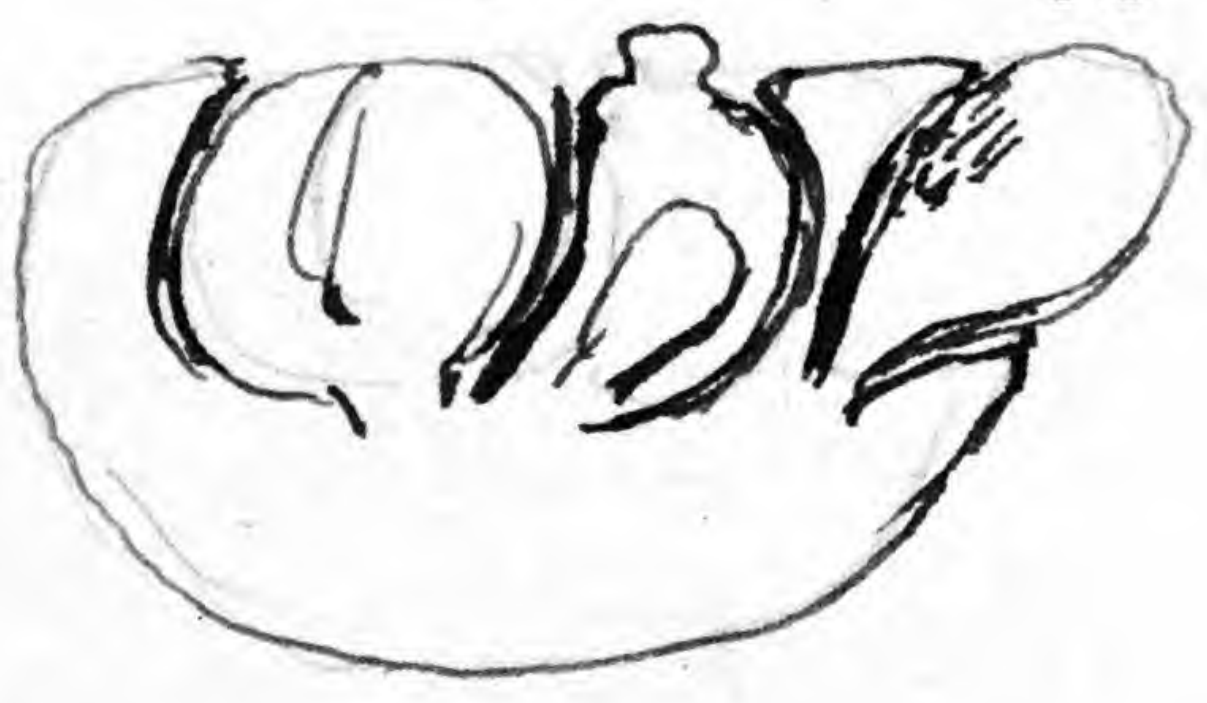
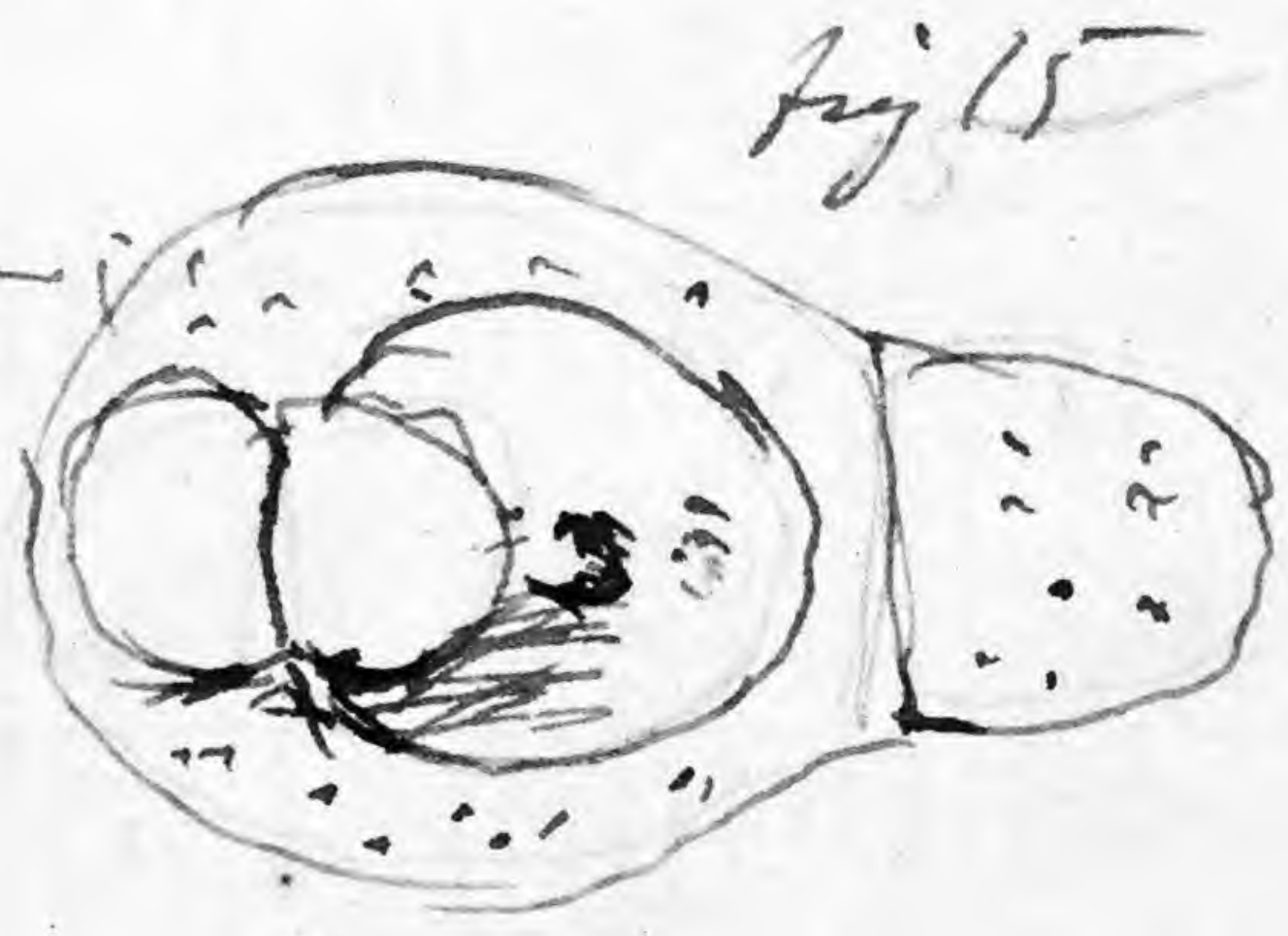


fig 15

$\frac{1}{40}$



$\frac{1}{45}$

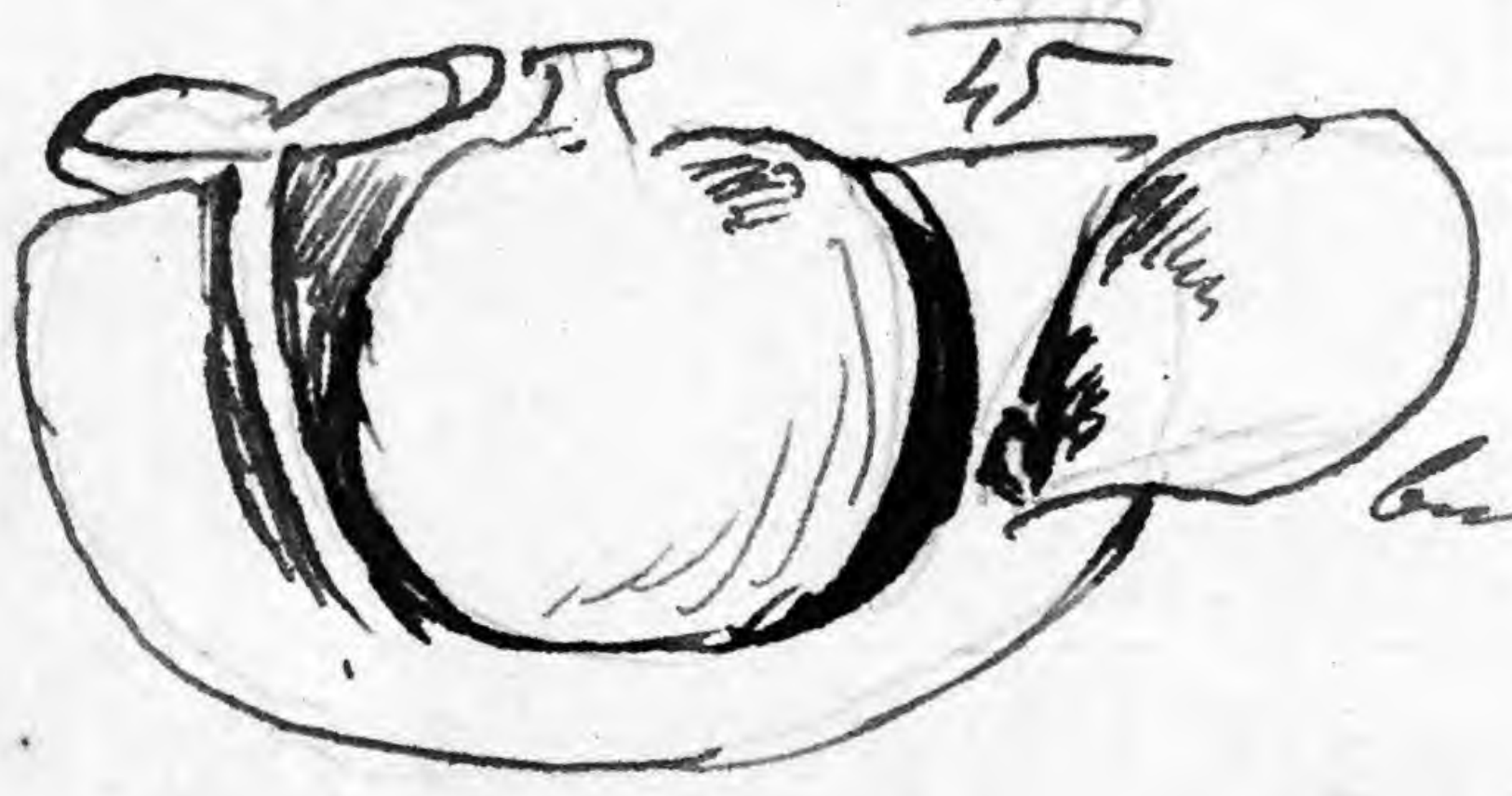


fig 16

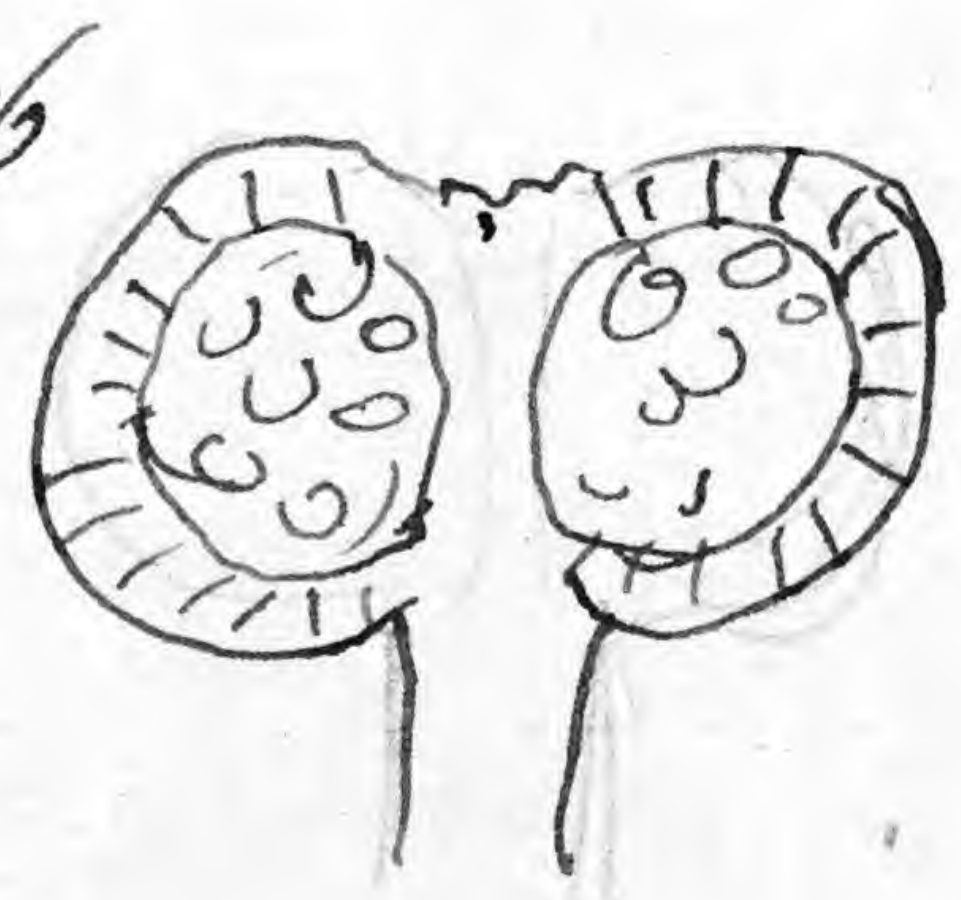
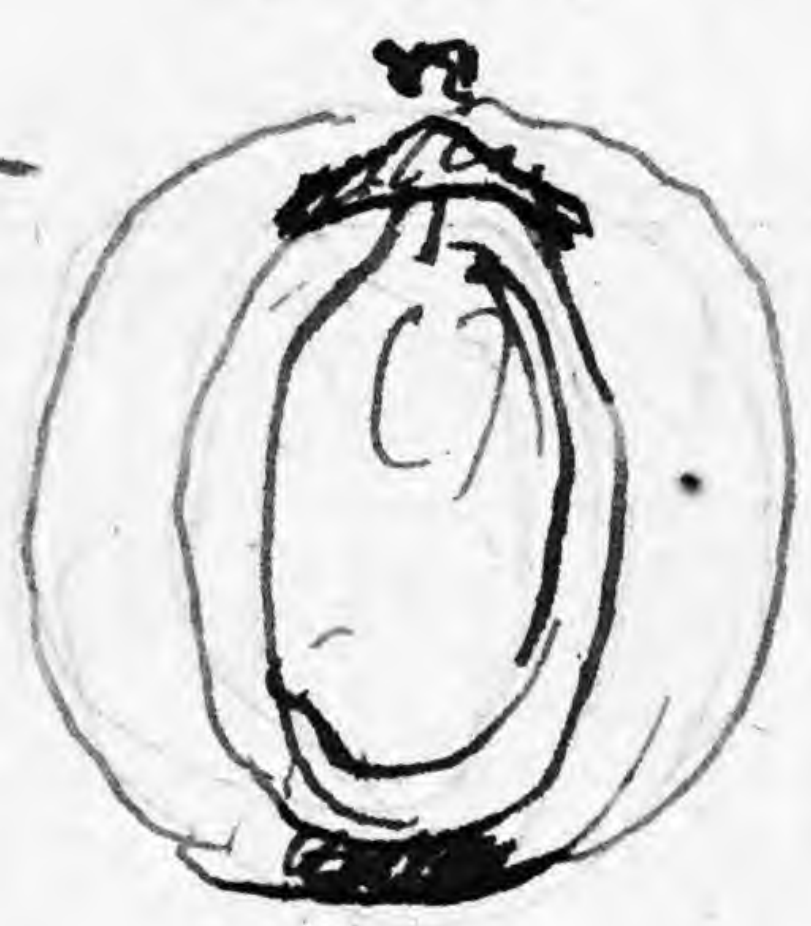


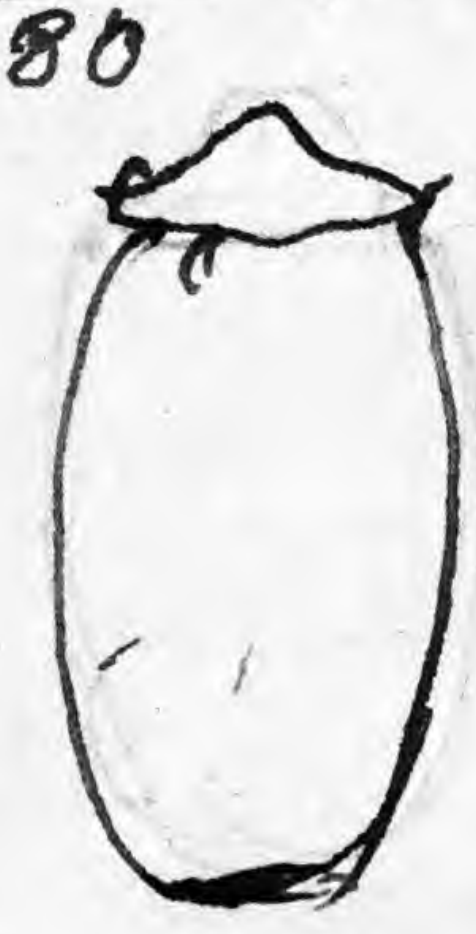
fig 12 $\frac{1}{125}$

21 fig 21

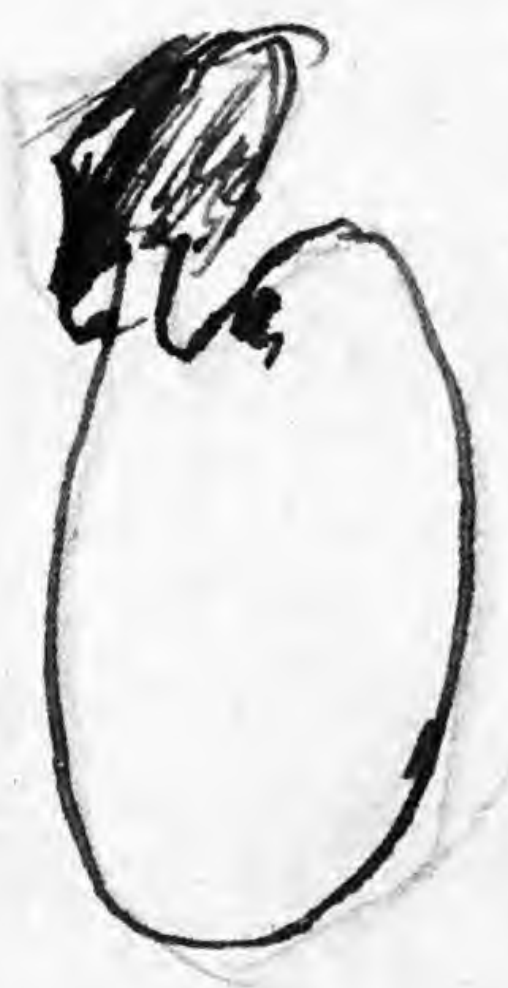
$\frac{1}{60}$



$\frac{1}{80}$ 22



23 $\frac{1}{80}$



2. young sterile, 8 fertile, ~~top~~ flowering view, showing anther and pistil 9 sect. of fertile frond.
12 anther, section, showing dissepiment.
15. fruit bearing frond, flat or reflexed valves of anther partly overlapping fruit.
16 section of same.
21 fruit, section 22 embryo with the coiffe
23 coiffe somewhat removed, showing the suspensor and the fente gemmulaire.

dimensions of plants, length without the bud

fig 2 $\frac{16}{40}$ = 0.40 mm
8. $\frac{23}{50}$ = 0.46
15 $\frac{26}{40}$ = 0.65
16 $\frac{38}{45}$ = 0.84

0.4 – 0.8 mm.

Epidermis cells $\frac{2\frac{1}{3}-4\frac{1}{2}}{300}$ mm diam. = 0.008 – 0.014 mm
stomata & their cells nearly $\frac{5}{300}$ long = 0.016 mm long
if correctly represented, a great deal smaller than ~~those~~ of my other plant
which are cells 0.018 – 0.028 mm diam
stomata 0.025 – 0.028 mm long

7862